DEVELOPING A STRATEGIC APPROACH TO ICT IMPLEMENTATION IN SAUDI SECONDARY SCHOOLS

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ABSTRACT

The massive advances in information and communication technology (ICT), in the last few decades, encouraged many developed and developing countries to invest in the ICT sector in education. The internet, computers, interactive whiteboards and an assortment of other technological tools have now turned out to be valuable teaching and learning resources. Saudi Arabia is not in isolation from this, they have invested heavily in the ICT field. However, the progression has often been disappointing; there is still a great gap between the availability of ICT technology and methods of implementation, resulting in a number of serious questions being raised for decision-makers and educators alike. One of the most important of these questions is ***'what factors affect the successful implementation of ICT in schools'***. Hence, the importance of this study is to find an answer to this question and related questions from the participants' perspective. Consequently, the research issue is addressed through a cross-sectional case study strategy, qualitative and quantitative mixed-method choices. In addition, a closed questionnaire and semi-structured interviews were used to collect data from four different perspectives (head teachers, teachers, students in Jeddah secondary school and two ICT directors in Saudi Ministry of Education. Generally, the results showed that ICT was perceived as an important tool in improving performance, collaboration, learning experience and learning outcomes. However, the study found some challenges that affect the application of ICT in Saudi schools, for example, the lack of space, resources, maintenance, a lack of ICT skills among school along with a lack in ICT training and a lack of clear ICT policies. However, the overcoming of such challenges could turn them from 'challenges 'into 'positive factors' to aid in the success of ICT implementation. Hence, the importance of this research is to suggest a strategic approach to guide decision-makers, educators and further studies in the future to promote the successful implementation of ICT in education, in general, and in Saudi secondary schools in particular.

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PREFACE

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ABBREVIATIONS LIST

ICT	Information Communication and Technology
CIB	Control and Investigation Board
SUSRIS	Saudi-US Relations Information Service
IT	Information Technology
WWW	World Wide Web
DBE	Department of Basic Education
HM Government	Her Majesty's Government, referred to as the UK Government
BECTA	British Educational Communications and Technology Agency
UAE	United Arab Emirates
MCIT	Ministry of Communication and Information Technology
ERfKE	Educational Reform for the Knowledge Economy
STP	Software Technology Parks
TAM	Technology Acceptance Model
TRA	Theory of Reasoned Action
TPB	Theory of Planned Behavior
MPCU	Model of PC Utilization
MM	Motivation Model
SCT	Social Cognitive Theory
TPACK	Technological Pedagogical Content Knowledge
CITC.SA	Communications and Information Technology Commission
KACST	King Abdul-Aziz City for Science and Technology
IDI	ICT Development Index
OECD	Organisation for Economic Co-Operation and Development
LRCs	Learning Resources Centers
DTCs	Digital Technical Centers
NICTP	Saudi National ICT Plan
CITC	Communications & Information Technology Commission
WIT	Women in Technology
IIE	Institute of International Education
MEPI	Middle East Partnership Initiative
NUSACC	National U.S.-Arab Chamber of Commerce
S.D	Strongly Disagree
S.A	Strongly Agree
SD	Standard Deviation
SA	Saudi Arabia

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CHAPTER I

INTRODUCTION

1. BACKGROUND

The success of any nation is linked to the standard of education that it delivers to its people. Therefore, most developed and developing countries realise the importance of investment in the education sector, especially in educational technology, which is considered a critical choice in educating and equipping students with the required skills to prepare them for the future (Umezinwa and Chigbata, 2013; Al-harbi, 2014). Related to this concept, Shaffer (2001, p.2) states, *'Today, real borders do not lie between nations but lie between those who can access ICT and those who cannot'*. Therefore, ICT (Information Communication and Technology) has become a strategic resource for the teaching and learning environment and a key tool for developing the quality of education (Noor-Ul-Amin, 2013). These resources, such as computers, the internet, interactive whiteboards and mobile devices are now widely used in the classroom.

Evidence reveals that with ICT resources in the classroom, students get involved more actively in the learning process as opposed to the conventional classroom, where they are passive observers and listeners (Asenso-Okyere and Mekonnen, 2012). Other benefits associated with the use of ICT in education include encouraging collaborative learning, equipping students with problem-solving skills and offering flexible learning opportunities (Almalki and Williams, 2012). Moreover, the labour market requires advanced skills in the use of ICT, which has led many experts to conclude that ICT skills are the main pillar to successful involvement in the labour market (Schwab, 2015; Sjodin, 2015).

Consequently, investment in education, especially in the field of ICT, has become an urgent necessity (Labelle, 2005). The UK government, for instance, published the largest learning project since the Victorian era. 'Building Schools for the Future' was a £55 billion scheme to reconstruct England's secondary schools. This project aims to refurbish, rebuild and provide new ICT tools to all 3,500 secondary schools in the UK by 2020. Furthermore, in the same year, the UK government declared supplementary schemes to perform research on the substitution of books with computers (National Audit Office, 2009; BBC, 2011a).

Saudi Arabia is not isolated from this as it is easily the largest ICT market in the Middle East in regard to capital value and its level of spending, with more than 18 million consumers and numerous global companies and its telecommunications and information technology industries

representing over 55% and 51% of the Middle East markets respectively, it still remains significantly underdeveloped in using the internet in education when compared to some countries (BuddeComm, 2015; Internet World State, 2015).

Consequently, the Saudi government has realised the importance of developing and investing in the ICT sector, especially in the youth sector, in order to develop public education. For example, in 2007, the Saudi government invested almost £2 billion in the "Tatweer Project" (Tatweer is an Arabic word which means development), which aims to equip schools with ICT tools, including computers, laptops, interactive whiteboards and projectors. This project also introduced training and development programmes for educators to ensure sufficient use of ICT in education (AL Riyadh, 2013; Tatweer, 2015).

In continuation of this support, more than 25% of Saudi's overall budgets for 2012, 2013 and 2014 were dedicated to the educational sector, (more than £150 billion). This adds to the already massive funds being pumped into the educational sector towards improving the education system and for the implementation of modern technology tools in the classroom (Ministry of Finance, 2015).

Furthermore, in human resources development, the Saudi Ninth Development Plan, (including higher and general education, vocational and technical training along with science, technology and innovation) intends to spend about £130 billion in this field. This corresponds to almost 50.6% of the total budget apportioned to the development sectors (Ministry of Economy and Planning, 2014).

However, over the last decades, there have been many debates and studies on the integration of ICT tools in education. For instance, an open debate titled is ICT in education a revolution or a fool's errand?, Son (2011) wonders why people still have a debate about the benefits of ICT in education and why this issue cannot settle after three decades. He believes that the cause of the continuation of this debate is that the question has been stated wrongly. He sees ICT as not just an application that can simply be evaluated once and for all, but a great and complex mass that has extensions in almost every phase of; education, commerce, industry and private life in the world. He suggested that the question should not be is ICT useful in education, but how can ICT be made useful in education, not because ICT is some magic invention that can solve all problems, but because ICT is important to provide students with information and skills that they desperately need. In the same context, Tinio (2012) supports this idea; he says that the successful implementation of ICT is not guaranteed. Its effective integration into schooling is a complex, multifaceted process and has factors that involve not just technology, but also

training, curriculum and pedagogy, school readiness, teacher competencies and long-term financing.

The successful implementation of ICT, therefore, requires identification of specific factors and issues that affect ICT application (Neyland, 2011; Tezci, 2009). As a result, the value of ICT tools is enhanced considerably when they combine with school objectives and vision (Garland & Noyes, 2004; Lim & Khine, 2006; Zhang, 2007).

1.2. RESEARCH PROBLEM

The research problem lies in the question of why, in spite of this increased spending and Saudi governmental support, the progression in the ICT sector has often been disappointing (Ashkar, 2013; Al-Harbi, 2014; Alkhalaf et al. 2011; Oyaid, 2009). As such, there is still a clear gap between the availability of ICT tools in Saudi schools and strategies/methods of implementation. Recent studies related to ICT in Saudi secondary schools (Oyaid, 2009; Almadhour, 2010; Almalki & Williams, 2012; Al-harbi.2014) concluded that the Saudi government needs to develop an effective strategy for ICT in education, to implement it into practice.

Almadhour, for example, concluded in his study, 'Unfortunately, although the Saudi Arabian government has lots of funding, there is no clear strategic framework towards equipping ICT in schools' (2010, p.62). Consequently, there is no meaning in just investing huge amounts of money in equipping schools with ICT tools unless they are used effectively (Tezci, 2009). Furthermore, the greater availability of technological resources in the classroom does not necessarily equate to improved academic achievement (Ungerleider & Burns, 2003; Bers, 2008; Wozney et al. 2006).

Hence, how to support the implementation of ICT in Saudi secondary schools, what barriers hinder its successful implementation, what the best methods to make the ICT application more effective are and what kind of support ICT stakeholders need remain serious questions for decision-makers and educators.

Accordingly, this research sets out to explore the factors that could affect ICT implementation in education, in order to propose a strategic approach for successful ICT implementation in Saudi secondary schools.

1.3. WHY SECONDARY SCHOOLS?

Globally, secondary schools are an imperative step on the road to obtaining a comprehensive education, in order to prepare students with knowledge and skills, for further higher education

(Alshmrany & Wilkinson, 2014). Wydick (2012) highlights the significance of secondary education: “All education levels are important, but secondary school is important primarily because it seems to be at that level that people are able to interface with more technology,” and describes it as "a bridge for youth from the study environment to the world of work." It is also crucial for the formation of personality, professional skills and communication skills, without which students are not able to become active members of society (Eubanks & Eubanks, 2002).

As the importance of secondary education has always been an accepted fact, it cannot be denied that ICT should be applied as much as possible. Thus, students can use the skills acquired in their everyday life and future work (Mohammed & Yarinchi 2013; Tekos & Solomonidou, 2009).

Saudi Arabia, is one of the most youthful countries in the world, with under-25s representing 50% of the population (Nureldine, 2015). In 2015, Saudi secondary schools had more than a million students (Ministry of Education, 2016). As is the case in most countries in the world, Saudi youth face great challenges on their journey from school to the labour market. For example, the Saudi youth need development in their skills and training in the area of ICT and development of technological literacy, in order to reduce the digital gap and prepare them for the labour market and life in the information society, taking advantage of future career opportunities in the public and global environments (Ministry of Economy and Planning, 2014).

Therefore, the Saudi government realized that creating and securing a quality education for Saudi youth must be a national priority. In addition, the success of their labour market will be heavily dependent on the skills and training provided to their youth. In this regard, the Saudi government, in 2010, developed the national youth strategy which focuses on: education, employment, health and the ICT sector. The main goal is to develop a comprehensive action plan to increase participation and efficient involvement of youth in the Saudi national development process (Ministry of Economy and Planning, 2014). This strategy focuses on the integration of ICT in education, to improve quality and provide access to people in remote regions (Ministry of Economy and Planning, 2014). In this matter, for example, the Saudi government has established Distance Education, the Saudi Digital Library and National Centre for E-learning, in an effort to realize the Kingdom’s mission of disseminating knowledge and making education accessible to all (SUSRIS, 2015).

Investment in youth, especially at early ages, is the key factor in building up the future of any nation and ensuring their prosperity. From the reasons mentioned above it can be concluded why the study has selected the secondary stage. It is worth mentioning, that the secondary

school, in this study, refers to boys and girls schools, for ages between 16-18 years; referred to in some countries as 'high school'.

1.4. SIGNIFICANCE OF THE STUDY

The significance of this study comes from its aim, which is to explore the factors that could make the implementation of ICT tools in Saudi secondary schools more effective and successful. Although the factors that hinder ICT implementation in education and the success factors for ICT implementation, in general, have been the subject of many studies over the last two decades, only a few studies, for instance, (Almaghlouth 2008; Alshumaimeri; 2008; Oyaid, 2009; Al-harbi,2014) have been conducted in order to examine and explore ICT implementation in Saudi schools.

There has been no study in Saudi Arabia, which has surveyed the perceptions of ICT stakeholders of both genders, including; students, school headmasters, teachers, as well as ICT directors in the Ministry of Education, regarding ICT implementation in Saudi secondary schools. Most Saudi studies have focused on the use of ICT on specific subjects, such as Science, Mathematics and Geography. In addition, the majority of these studies (in the ICT context) were of a small scope; unpublished research projects conducted to fulfil degree requirements (i.e. Master's and PhD degrees).

Therefore, this study attempts to fill a key gap in the literature, proposing a framework to gather essential data that allows an emphasis on the areas where the hindrances mainly lie and how they can be resolved in Saudi secondary schools. This approach means that previously unheard voices can now be considered and, subsequently, key areas can be underpinned that will clearly show where steps can be taken to make improvements at each individual level.

However, the majority of studies related to ICT implementation in education have been carried out in developed countries (Shaw, 2010), while ICT in the Saudi educational system is somewhat new. There are some factors affecting ICT implementation in Saudi schools which differ from Western countries; for example: culture, economy and educational system. Therefore, further research needs to be undertaken to investigate the current situation in Saudi schools, in order to determine the challenges that could prevent the implementation of ICT and suggest the main factors that could make the use of ICT in Saudi schools more successful.

Finally, the results of this study could considerably benefit the Ministry of Education in Saudi Arabia by enhancing their awareness about the current situation in Saudi secondary schools and factors that might hinder ICT implementation. In addition, the findings of this study might assist

the decision makers at the Ministry of Education in making informed decisions regarding the training and development of teachers that will result in an increased use of ICT to support the educational process.

1.5. SCOPE OF THE STUDY

The scope of this study is limited to Saudi secondary schools in Jeddah city. The participants of this research included only the direct ICT users at schools (headmasters, teachers and students in public secondary schools and some ICT directors in Saudi Ministry of Education). It is worth mentioning that the headmasters and teachers in Jeddah city public schools are 100% Saudi nationals.

Therefore the scope of the sample is restricted to Saudi headmasters and teachers and does not include private schools and foreign staff members. The focus of the study is on the main barriers and factors that could prevent or help ICT implementation in order to develop a strategic approach towards the implementation of ICT in Saudi secondary schools. Therefore, the study did not take the perceptions of parents about the current ICT situation in schools, because they are not the direct users of this technology. Hence, ICT issues that are known to workers at the school, would not be known to parents. Parents are unaware of what is going on inside the school and probably do not have the appropriate solutions. Therefore, their participation in the study may affect the credibility of the results. However, due to time limitation, financial restraints and other barriers such as approval from the Saudi government, this study limited itself to develop a strategic approach to ICT implementation in Saudi secondary schools only and did not include evaluation phases. Nevertheless, the proposed strategic approach provides guidelines for ICT implementation for the Saudi secondary school system as well as critical success factors for the educational environment.

1.6. AIM AND OBJECTIVES

The main aim of this study is to develop a strategic approach towards the implementation of ICT in Saudi secondary schools. This aim can be achieved via the following objectives:

1.6.1. OBJECTIVES

- To develop an understanding of the definition of ICT term and its historical development to date.

- To examine theories, policies and strategies used to implement ICT in education in order to build a conceptual framework that reinforces the criteria for ICT implementation in education.
- To examine current ICT implementation in Saudi secondary schools, guided by criteria defined in the study's conceptual framework.
- To identify the factors that might facilitate or hinder the application of ICT tools in general and in Saudi secondary schools in particular.
- To propose a strategic approach for ICT implementation in Saudi secondary schools and draw recommendations.

1.6.2. RESEARCH QUESTION

Based on the research purpose and objectives, the study aims to answer the following research questions

- What are the factors that contribute to the successful implementation of ICT, both in general and in the Saudi educational system in particular?
- What are the barriers that face the implementation of ICT in general and in the Saudi educational system in particular?

1.7. RESEARCH APPROACH

To achieve the research aim and objectives, also to answer the research questions, three phases have to be completed as presented below.

❖ ***Phase I Reviewing the literature***

This phase aims to review the literature to:

- Develop an understanding of the historical development of the ICT concept
- Examine some educational ICT policies, strategies and initiatives in some developed and developing countries.
- Study some models and theories related to ICT implementation in education
- Investigate the current implementation of ICT in the Saudi educational context
- Identify the main challenges/factors that could impede or facilitate ICT implementation in education, in general and in the Saudi education system in particular.

❖ ***Phase II: Research Methodology***

This phase aims to determine the research philosophy and approach, methodological choice, research strategies, time horizons and, finally, the techniques and procedures that have been used to collect and analyse data.

❖ ***Phase III: Data Collection***

The aim of this phase is to collect more information from the qualitative and quantitative data (semi-structured interviews and questionnaires) in order to find out about:

1- ***The School Level,*** which includes:

- The Saudi school culture (Staff views, attitudes and level of satisfaction towards integrating of ICT in education).
- Saudi headmasters and teachers roles in ICT.
- Challenges/factors that affect ICT implementation in Saudi schools.

2- ***Government Level,*** which includes:

- Saudi policy and strategy towards ICT
- ICT as a subject
- Resources (ICT resources, qualified teachers and financial resources)
- Creating an attractive learning environment
- Challenges/factors that affect ICT implementation.

1.8. ORGANISATION OF THE THESIS

The study is categorised into seven chapters as detailed:

Chapter 1: Introduction

This chapter presents a background of the study, which includes the rationale for the study and explanation of the research problem. This is followed by the main aim of the study, objectives, research questions and significance of the study. Next is the research approach, which has been used to achieve the research aim and objectives. Finally, the last section illustrates the research design.

Chapter 2: ICT in developed and developing countries

This chapter aims to review the literature to outline ICT history, the stages of ICT development and the evolution of the term ICT (from being known as an educational technology to ICT). Furthermore, the advantages and disadvantages of ICT in education and the integration of ICT in developed and developing countries, including initiatives and strategies that have been used to implement ICT in education successfully, are assessed.

Finally, there is a review of popular technology theories and models in education in order to propose the study framework.

Chapter 3: Saudi Arabian Background

This chapter is a review of the relevant literature on ICT in Saudi Arabian secondary schools, as a case study of this research. It gives an overview of Saudi Arabia, followed by the Saudi educational system and the history of ICT in Saudi educational systems. The main aim of this chapter is to identify the factors affecting ICT implementation in Saudi schools. In order to identify these factors the study uses the conceptual framework identified in chapter 2 (see section 2.7 for further details).

Chapter 4: Research Methodology

This chapter illustrates the research methodology and discusses all the criteria that will be used when selecting research methods.

Chapter 5: Qualitative Data and Analysis

This chapter analyses the interview data and shows the results of case studies carried out to obtain the perspectives of headmasters, teachers, students and ICT directors in the Ministry of Education towards the research issue. Results from the interviews are discussed and interpreted. At the end of this chapter, there is a summary of the main findings from the qualitative data analysis.

Chapter 6: Quantitative Data and Analysis

This chapter presents a description of the quantitative data analysis and an interpretation of the findings of the questionnaires that were carried out. In addition, there is a summary of the main finding from the quantitative data analysis.

Chapter 7: Discussion of Qualitative and Quantitative Results

This chapter discusses the results from qualitative and quantitative data (parallel) in order to define the main factors that affect ICT implementation in Saudi secondary schools.

Chapter 8: Discussion, Recommendations and conclusion

This chapter aims to discuss the outcome of the study, in lights of its objectives, with aim to suggest the strategic approach for successful ICT implementation in Saudi secondary schools. In addition, it shows a summary of the main findings, the conclusions and recommendations derived from the research. Furthermore, this chapter provides what the study contributed to knowledge. Followed by limitation of the study, suggestions for further research and the conclusion of the study.

CHAPTER II

GLOBAL ICT IMPLEMENTATION

2. INTRODUCTION

This chapter aims to examine the historical development of ICT and the stages of evolution of the concept of educational technology up to its current conception (ICT) in order to find a clear definition of the term of ICT within education. Identifying this will help to define the scope of the study, as the definitions of ICT have constantly changed with recent developments, and the lack of a single fixed definition has resulted in various analyses and debates over time. This chapter also aims to identify the optimum use of ICT by reviewing different experiences in some developed and developing countries, as well as the popular theories in ICT implementation in education, in order to identify key indicators that have helped to make the integration of ICT more successful in education. Hence, the study is able to conclude with a conceptual framework to help its approach in examining the current implementation of ICT in Saudi Arabia secondary schools. By means of the different stages of the literature review in this chapter, the study was able to achieve its first objective (see Chapter 1).

2.1 THE HISTORY OF ICT

To find a clear definition of the term 'ICT' in education one must consider how the concept of educational technology has evolved up to its current definition (ICT). Therefore, the aim of this section is to examine the historical development of educational technology until its current position (as one of the study's objectives). In general, the history of ICT has encompassed four revolutions (Kaino, 2008). The following section discusses each period.

- ***The first revolution***

The integration of technology in the media began with the printing press by Johannes Gutenberg in 1440 (The Great Idea Finder, 2007). Print rapidly became the main medium through which knowledge was transferred, and the education of the upper classes, and then of the masses, achieved. From the 16th and 17th centuries onwards began the period known as the **"*electronic revolution*"**, a time in which advancements in technology brought forth a more dynamic and captivating way to tell stories and transfer knowledge (Stanford, 2012), although the original objects used, such as the Magic Lantern, invented by Huygens in 1659 (Verme, 2005), may seem crude by today's standards.

Eventually, the Magic Lantern was superseded by the invention of film, developed by the Lumière Brothers in 1899 (Manley, 2011). Other new forms of media included the radio, invented by Heinrich Hertzin in 1886, the television in the 1920s, and, later, recording devices, such as cassettes and VHS players (Ledo, 2009).

- ***The second revolution***

Often described as the **"*communications revolution*"**, this equipped the mathematical industry with microcomputers and telecommunications, and, as early as the 1960s, computers began to be used for educational purposes (Kovarik, 2011). By the 1970s, the machines had become sufficiently compact and affordable to enter people's homes, with Apple, Tandy and Commodore computers producing some of the earliest models around 1977 (White, 2008). The early stages of the internet were also developed in the 1970s, with Vinton Cerf and Bob Kahn creating the TCP/IP protocol in 1974 to transfer files quickly and post information publicly (Spira, 2003).

- ***The third revolution***

Regarded as **"*Information Technology*"** (IT), this refers to the integration of these technologies into every aspect of computing, which happened in the 1990s (Stanford, 2012). At this time, the term **"IT"** was substituted for the phrase "computers", symbolising a transfer of concentration from computing technology to the capability to collect and extract information (Pelgrum and Law, 2003).

- ***The fourth revolution***

This took place in 1992, when the term IT was replaced by **"*Information and Communication Technology*"** (ICT), implying that not only information, but also communication, is facilitated and mediated by technological advancements. Having started from mathematics, ICT has proceeded to penetrate into virtually all domains of human activity, including the education sector, revealing new opportunities for the latter. Furthermore, ICT has become a companion of globalisation in its strengthening of interconnectedness, a process of elimination of economic borders and increase in global exchange and transitional interaction characterised by uniting people around the world into one global community (Kaino, 2008).

An important component of the concept of ICT is the worldwide web (WWW), which became a huge success throughout the 1990s and 2000s, infiltrating not only schools and businesses but also people's homes. In the 1990s, many educational institutions, from primary schools right up to universities, created a space for themselves on the net in the form of text-based websites, using many forms of ICT in teaching and learning (Becta, 2004a).

As a consequence of the recent rapid growth and influence of the internet, almost 3.2 billion people (out of 7.2 billion) across the world were found to be using it in December 2015 (Internet World Stats, 2015). However, the history of ICT can be classified into three eras. (Roblyer and Doering, 2010; Timetoast, 2011). (See table 2.1).

Era	Year	Invention
Pre-microcomputer Era	**1910**	Silent Film entered education
	1927	Broadcast radio was in schools
	1936	BBC began regular television broadcasts
	1950	First computer used for instruction
	Early 1970s	Computer-assisted instruction (CAI) movement emerges
	Early 1970s	CAI movement declines and Computer literacy movement begins
Microcomputer Era	**1977**	First microcomputers in schools The Apple corporation is founded
	1981	The IBM corporation begins
	1982	The Personal Computer was introduced
	1990	The mobile phone becomes more than just for the government
	1991	The first interactive white board, but it was 10 more years before they became part of education
The World Wide Web Era	**1994**	The advent of the World Wide Web The Netscape navigator released
	1995	Microsoft released Windows 95
	1997	Internet Explorer version 4 released
	1998	The Search Engine Google is founded
	1990	Bluetooth was announced
	2000	Microsoft released Windows 2000 Apple introduces the iPod
	2001	Wikipedia, a Wiki free content encyclopaedia goes online
	2004	The advent of Web 2.0
	2007	The first iPhone is released beginning the development of "smartphones"
	2010	The first generation iPad hits the market beginning the development of tablet computing
	UP TO 2016	A dramatic development in the telecommunications sector, especially the new generations of smartphones, computers, tablets as well as social media

Table 2.1: The history of ICT (Roblyer and Doering, 2010; Timetoast, 2011: ReportLinker, 2016)

Given that the study has examined, in the previous section, the stages of technology evolution, the aim of the following section is to find a clear definition of the ICT term within education as the study's first objective. Identifying this will help to define the scope of the study, as the definitions of ICT have constantly changed with recent developments.

2.2 DEFINITION OF ICT

Much of the literature attempts to define ICT in various ways, as, given its diverse and multifaceted nature, it is a key concept with a definition that can change with time. Although, the term "ICT" has recently become more widely used in the world, there is no agreement on one clear definition (Apulu and Latham, 2011; Zuppo, 2012). This is because such technology is fast changing in nature, with the development of new technologies. For instance, at one time, the term "technology" was used to define only hardware. However, this term now refers to both hardware and software (Burke and Weill, 2009).

In general, the abbreviation of the term ICT can be seen as a development from two unrelated concepts, *"Communication Technology and Information Technology"* (Gholami, 2006, p.5). The term ICT, therefore, is the result of the integration and convergence of these two concepts of communication technology and information technology. An example of this sort of integration is seen in, for instance, the emergence of new generations of computers and mobile phones (Gholami, 2006).

According to Daniels (2002), there seems to be a misconception that learning technology generally refers to computers and computing related activities. This is not the case. Although computers and their application play a significant role in modern information management, other technologies and/or systems are also included in the phenomenon that is commonly regarded as ICT.

One possible definition, which explains this relationship between communication technology and information technology, is "the combination of networks, hardware and software as well as the means of communication, collaboration and engagement that enable the processing, management and exchange of data, information and knowledge" (DBE, 2011, P.50). Accordingly, traditional communication technologies and the modern versions of digital devices are integrated, which, in turn, provides a comprehensive definition of ICT.

Here it is essential to highlight the fact that the definition of ICT has and will be different according to different sectors, for example, business corporations may understand and define ICT as to what they see more important; that could include networking, using social media for advertising and business software etc. In contrast, a police or intelligence agency may understand ICT to be the best way to provide protection systems, alarms, cameras and increased security devices. For the purpose of this research, the definitions looked at are narrowed down to those used within and for the education sector.

The early definition of ICT according to Blurton (1999, p.46) is a *"diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information".*

The general definition of ICT has been described by Selwyn (2004, p. 346) *"ICT is best seen as an umbrella term that includes computer hardware and software; digital broadcast and telecommunications technologies as well as electronic information repositories such as the World Wide Web or those found on CD-ROMs".* According to Anderson (2010), it may be regarded as the combination of informatics technology with other related technologies, specifically communication technology.

More recent definitions tend to cover the variety of uses of ICT within different applications and uses across the globe. However the primary definition still revolves around the devices and infrastructures that facilitate the transfer of information through digital means (Zuppo, 2012).

In education, however, there are two different ways to use the term of ICT. Firstly, it can be referred to the school subject, in which pupils learn about ICT, such as computer science, computer literacy and information literacy (Education and Training, 2014). Secondly, ICT can be referred to the use of different types of educational technologies as mediators, such as audio conferencing, interactive voice response systems, television lessons, teleconferencing, radio broadcasts, email, interactive radio counselling and audiocassettes, which have been employed in the teaching environment for many different purposes (Shamim & Abu Raihan, 2016; Noor-Ul-Amin, 2013).

Al-Harbi (2014) reports that ICT in education relates to the tools that are used for communicating, sending and gathering information, which could include software applications, access to the internet, local networking infrastructure and video conferencing, as well as hardware, such as computers and other devices.

To sum up, and based on the previous definitions, ICT in this research refers to a diverse set of technological tools and resources (hardware or software) used to communicate, and to create, disseminate, store, and manage information that is currently used in education such as; computers, interactive whiteboards, projectors, mobile phones, recorders, and digital cameras. Figure 2.1 below illustrates some of the breadth of technology that is employed in the classroom.

Figure 2.1: Example of some ICT devices in education

What has been mentioned, in this section, has value for this research, because it puts into context the meaning and using of ICT in education and shows that overtime, ICT is evolving and hence its definitions. Although ICT is advancing at a fast rate, no agreement on one clear definition. As a consequence, lack of a universal and fixed definition has resulted and continue to result in varied definitions as well as applications. It is, therefore, important for the object one of the study to get a clear definition of ICT that be used across all schools as well as at the Ministry of Education to enhance the development of ICT as a subject for teaching and for application.

Identifying a clear definition and understanding of ICT meaning will also help shape policies and provide an agreed framework to work on issues include subject, hardware and software as well that are understood by all partners. The understanding of the evolution of ICT additionally provides us with insights into the various level of commitment and engagement that the government has had and how the current situation fits in comparison to other countries. This helps the study to understand where and how Saudi Arabia can invest more to ensure good ICT implementation strategies and policies.

2.3. ADVANTAGES AND DISADVANTAGES OF ICT IN EDUCATION

Understanding the benefits and detriments of using ICT in education is an important matter for users, in order to enhance ICT benefits, improve the correct use and reduce the harmful effects and avoid falling into them (Edinson, 2011). Recently there are a growing number of studies that confirm the integration of ICT in education have several advantages and disadvantages (Arkorful & Abaidoo, 2014; Jurka & Samec, 2012; Algahtani, 2011; Al harbi, 2014).

Therefore, this section aims to present ICT affordances and constraints in education, these are of particular interest to this study as it allows an in depth understanding of why some places may be more eager or more reluctant to increase the use of ICT in schools at the Saudi secondary level, which could help in the formatting of the current study framework. The following section presents the benefits of using ICT in education.

2.3.1. Advantages of ICT in Education

- ***Raise education level***

Prior to ICT arrival, education was regarded as one single process executed in an isolated environment. However, ICT integration has made education an open system, expanding and simplifying access to information, with the Internet providing global access to different data resources and facilitating global communication without boundaries (Arkorful & Abaidoo, 2014). In this matter, Noam (1995, p.1) comments, *"In the past, people came to the information, and the information was at the university. In the future, the information will come to the people, wherever they are".*

Through such innovative ICT opportunities, educators can reach their students in any part of the world, and learners can become involved in independent learning and search for additional information without being dependent on contact with a teacher (Mohammed & Yarinchi 2013).

Therefore, the initial purpose pursued in ICT implementation was to raise education to a higher and more advanced level of quality, to create common constants through information and knowledge sharing, and to liberate the existing educational system from the vestiges of the past (Tekos & Solomonidou, 2009).

This is an important advantage to consider when attempting to understand how ICT can be better implemented in schools, as this study focuses on, since it can make a difference to how education levels are raised through the use of ICT.

- ***Documentation management***

ICT is an effective tool in academic documentation management, enabling the control and maintenance of databases, spreadsheets, and presentations. In addition, ICT offers the most diversified and solid data source that can assist researchers in their data gathering and investigations. In these ways, the integration of ICT into the educational process promises a considerable advancement of educational outcomes both for students, by equipping them with the skills vital for their future employment, and also for the professional development of teachers, who can utilise ICT tools for the diversification and enrichment of their teaching materials, methods, and techniques (Omona & Weide, 2010).

This is important for this study, because if educators shift over to an online material and text system, they can benefit from new research at hand and save the time and cost of printing sheets and losing work. The application of ICT resources in the school system will also need to be organised on a number of different levels, from seeing how one can manage documents, or for using online systems for registrations, absences and learning resources. These advantages, if not fully understood, will have a huge impact on the use of ICT and, therefore, can be barriers to applying ICT in the education sector.

- ***Improve learners' capabilities***

Another significant application of the term ICT is the so-called ICT capability, which relies on both cognitive and technical proficiency to access, retrieve, use, produce, develop and disseminate information appropriately and utilizing ICT tools. Learners are likely to demonstrate this capability when they know how to apply and use technology in a way that facilitates their learning (Brush et al. 2008). As a result, learners are able to solve problems, to exchange and analyse information, to produce their own ideas, to develop models and take control over devices, showing discernment in their use and choice of ICT tools and information. Moreover, they can recognise the value and contribution of these ICT tools to their progress in their studies through systematic review and evaluation (Hertlein & Ancheta, 2014). The term ICT capability refers, therefore, not only to the acquisition of competency in operating technical resources and software applications, but also to the development of the ability to select, execute, and evaluate outcomes. Hence, it is essential in teaching ICT capability to educate learners in identifying the ICT tools available and determining when and why to use them to achieve the objectives (Pierce, 2013).

- ***Prepare students to the labour market***

A more regularly cited reason for the employment of ICT within classrooms, especially in high schools, is that it prepares the present generation of learners more effectively for a work environment in which the use of ICT, especially computers and the internet, is becoming progressively omnipresent (Schwab, 2015; Sjodin, 2015). Technological literacy or the capability to employ ICTs tools competently and successfully is therefore viewed as providing a competitive advantage in a progressively globalised labour market. Hence, it can help present generation of learners to understand the importance of how computers and computer software are applied their future jobs (World Economic Forum, 2014).

For this research it is important to examine to what extent educators understand the advantages that ICT could provide for future work and professional roles, and the importance of ICT to be a part of the school system from the very beginning, and this is a key hook to implement ICT within lessons.

- ***Communication***

Another area of ICT application in education is that ICT facilitates communication between teachers and students to discuss their thoughts and share their perceptions in the subject area, so allowing for the matching of learning styles and techniques in a more effective way (Hertlein & Ancheta, 2014). In addition, ICT could be a channel to communicate with parents, by giving them more opportunity to be involved with the school community (Jewitt et al. 2010). Students' reports can be presented with high quality and can be made more comprehensible. In addition, it gives the parents greater access to more accurate information such as student's attendance, behaviour and attainment raising awareness of pupils' education and proficiencies, due to a rise in learning activity being located at home. Furthermore, school calendars, term times and activity logs can all be viewed online by individual log in details for each child. This maintains privacy and confidentiality and saves time for parent teacher meetings (Jewitt et al. 2010).

To sum up, the examples provided of the affordances that ICT could offer to the teaching and the learning process, albeit limited in scope; demonstrate the positive influence ICT is having on enhancing the educational process and its outcomes. It is clear; moreover, that the present trend of integrating ICT into teaching and learning is a global one, and that the importance of ICT tools in education is publicly acknowledged. This viewpoint is supported by several studies and research in specific subject areas (Schwab, 2015; Sjodin, 2015; Mohammed & Yarinchi 2013), which concluded that this process of integration of ICT in education, although

challenging, is likely to produce considerable positive outcomes in the areas of teacher performance and student learning.

2.3.2. Disadvantages of ICT in education

Despite the great benefits that ICT provides in general and in education, in particular, it is not devoid of being a double-edged sword, it has its pros and cons. The misuse of ICT is one of the main drawbacks of ICT in education. For example, some students tend to misuse technology for leisure time activities and have less time to learn and study (Youssef & Dahmani, 2008). Some students, instead of using the computers at school for their studies and online learning, just use it for visiting social media. Consequently, following their teachers in lessons is no longer the main priority for them, and this could cause lower academic grades (Luno, 2006).

Here ICT is seen as a deterrent to the learning process and improving the students' performance it is meant to. This could also lead to create a 'digital gap' within the classroom between teachers and students, which may affect the communication process between them, as ICT becomes the instrument of connection rather than face-to-face communication. Thus, the distance of the relationship between is increasing. Furthermore, using the internet can lead to serious consequences for students in terms of its potential for negative influences, such as terrorism, pedophilia, pornography, racism and credit card fraud, and could even result in contact with dubious people, such as prostitutes and paedophiles (Luno, 2006).

In addition, privacy and security of personal information is a huge concern and can often be perceived as a disadvantage of ICT. Information collected, stored and searched online can be a real worry as the reduced control over who has access to personal data such as internet searches and electronic payments leaves negative consequences for ICT users. The lack of transparency on the law, policies and ethics of data protection can cause real concerns (Stanford, 2014). Schools should raise awareness regarding security and protection of information to ensure students are fully aware of the risks and how to protect themselves (NSPCC, 2014; Luno, 2006).

Another essential disadvantage of employing ICT tools within institutions is the fact that they are costly. Hepp, et al. (2004) state that, in the majority of institutions, ICT comprises the sole greatest curriculum budget expense, which could clearly be viewed as positive, but on the other hand does not leave much money remaining for additional important expenses. For example sports and exercise equipment, budgets for competing with other schools or trips.

Although there has been some criticism of the use of ICT in early education, with suggestions, at its most extreme, that it is unhealthy and hinders learning (Siraj-Blatchford, Whitebread, 2003).

2.4. TOWARDS THE SUCCESSFUL IMPLEMENTATION OF ICT IN EDUCATION

The enormous variations in the employment of ICT between developed and developing countries are clearly obvious. For instance, the developing countries are subject to many factors, which may hinder its implementation, such as a lack of funding, restricted internet availability, the absence of qualified teachers and the lack of long-term plans and strategies (Niebel and Mannheim 2014). In addition, in some developed countries, the greater availability of technological resources in the classroom does not necessarily equate to improved academic achievement (Murgia, 2015; Wozney et al. 2006). Therefore, many of these countries have realised the importance of planning to overcome these obstacles through designing policies and strategies to make the integration of ICT tools in the educational system more effective (Wallet, 2014).

The aim of this section, therefore, is to examine some of the ICT strategies, policies and initiatives that have been used in some developed and developing countries in order to determine the main success factors of ICT implementation in education.

2.4.1. ICT in Developed countries

In the United Kingdom, prior to introducing ICT in the education system, the national infrastructure was supported by various software and databases developed for education, and the government made the studying of ICT courses one of the 11 mandatory subjects in the UK's national curriculum (Jun, 2015). Hence, the UK ICT implementation strategy promotes the use of ICT tools universally, in order to break down barriers, establish connectedness, improve public services, including education, and to guarantee stable economic growth (HM Government, 2011).

Prior to promulgation, the e-Strategy of the state (UK) for the educational framework, the British Educational Communications and Technology Agency (BECTA) published an evaluation study in order to assess the impact of ICT within the educational framework and the progress attained in acquiring state standards in 2005-06. One major conclusion of this study is that more than 75% of the pupils had not previously utilised a computer in a lesson in their school practice, although they had been 'taught' to utilise ICT (Malcolm et al. 2006).

Regarding this issue, a report on ICT in the UK secondary schools, by the BBC (2011b) declared the poor state of ICT in UK schools, citing poor teacher skills and confidence to sufficiently teach difficult subjects. The report mentions poor teaching in areas including databases and programming, with a number of students performing better outside the classroom.

Nick Gibbs, Minister responsible for schools observed the apparent patchy instruction in ICT, with prominence in some areas and deficiency in curriculum and course content in others. He noted the necessity to change the focus from acquiring aging hardware to enhancing instruction quality for technological proficiency. He emphasised meticulous scrutiny of ICT as a part of the national curriculum appraisal and the observation of the requirement by the computer faction to include comprehensive computer science classes to enhance proficiency (BBC, 2011b).

According to Balanskat and Blamire (2006), one of the reasons for this failure is seen as being due to the ambiguity and lack of the governmental ICT policies, which refer to computers as "learning tools", but do not focus on how teachers should use ICT in educational processes.

As a result, in 2011, the UK government published its largest learning project since the Victorian era, 'Building Schools for the Future', which was a £55 billion scheme to reconstruct England's secondary schools. This project aims to provide schools with contemporary computer technology and Wi-Fi accessible "learning hubs", with individual laptops, to perform autonomous research and the substitution of books by computers (BBC, 2011a). As a result, about 70% of the primary and secondary schools in the UK use tablet computers frequently (Tech Knowledge, 2013).

It can be concluded that the UK education policy relies on renewing the infrastructure and the restructuring of old school buildings, while providing all the necessary ICT means in schools, and, in addition, attention is paid to the development of ICT as a mandatory subject, and enhancing online searches (HM Government, 2011). The UK further strategized a universal application and use of ICT as a way to bridge education, economy and public services.

In chapter three, the study will discuss the disconnection and a currently experienced in Saudi strategy where ICT in the economic and public sector is growing at a faster pace than in the education sector. Saudi Arabia can learn from the UK for the need to integrate all key ICT sectors to increase efficiency, acceptability and universality of ICT use.

Singapore, too, has recognised ICT as a driver of its education sector, with the launch of its ICT master plan in 1997, with its primary goal of ensuring the effective integration of ICT tools in the school curriculum, along with the development of a culture of lifelong learning, thinking skills, and social responsibility. The goals pursued by the master plan were to design curriculum and assessment techniques, provide learning resources, conduct teacher development, and build a technological and physical infrastructure.

Lim (2007) examines the efficiency of Singapore's master plan in four Singapore schools, two primary and two junior colleges, in managing barriers to ICT implementation. He found six operating strategies, based on the observations of ICT lessons and face-to-face interviews with teachers, directors of ICT and school headmasters. These included:

1) Technical support staff
2) Training of student ICT helpers
3) Time for teachers to prepare for ICT
4) Collaboration among teachers
5) Support provided by the headmaster in addressing teachers' ICT concerns
6) Training for teachers on how to use ICT in the classroom

The study also discovered improvements in the schools' digital base, due to the fact that the ICT strategy allowed educational institutions to allocate funds in compliance with their ICT needs, thus providing students and teachers with all the resources they required.

Although Lim's study was in primary and junior colleges, he addressed key factors for ICT implementation. This research evaluates Lim's work in terms of ICT application by teachers and students, and assesses the availability and roles of technical support, the training and skills of teachers in ICT and the support provided by the headmaster in addressing teachers' ICT concerns. Understanding implementation factors is therefore important to advancing ICT in Saudi schools, and this makes Lim's model highly relevant to the current research.

Singapore adopts a relatively different approach, focusing in building infrastructure, developing integration of ICT tools in the school curriculum, and the development of a culture of lifelong learning, thinking skills, and social responsibility. This approach transfers the social responsibility to ICT users and resources are provided to integrate ICT in education.

The current study examine the Singapore's approach in ICT implementation in education, especially the importance of the infrastructure and social responsibility in the integration process of ICT implementation. In a community integration of ICT tools in the school curriculum, along with the development of a culture of lifelong learning, thinking skills, and

social responsibility. How can Saudi enhance these aspects is suggested in the conceptual framework and in the discussion of the study objectives.

In Australia, the Ministry of Education instituted a national framework for ICT in education, 'Making change happen framework' has been developed, following consideration of Australian government initiatives and other international initiatives.

It is considered as a guide for strategic planning and reflection, for the implementation of ICT in teaching, learning and administration process. Furthermore, it is a tool that school headmasters, teachers and the school community can use to review and assess where they are now and where they want to be into the future, and to monitor their development (Learning in an online world, 2008). The framework, defines the contribution ICT can make to the following ten factors of quality education as illustrated in the table below.

Element	
1. Personalising and extending student learning	Personalising and extending student learning refers to the school's capacity to use ICT to extend and differentiate student learning opportunities, and to support students to manage and direct their learning.
2. Enabling leadership	Enabling leadership refers to the ways in which school leadership establishes the ICT vision for the school and supports all aspects of implementation and change–management across the school.
3. Supporting professional learning	Supporting professional learning refers to the school's planning for and implementation of professional learning that contributes to improved teacher quality and the integration of ICT in curriculum, pedagogy, assessment and administration.
4. Connecting learning beyond the school	Connecting learning beyond the school refers to the school's use of ICT to support communication and collaboration with the wider school community, and to connect students and staff to external knowledge and learning networks.
5. Improving student assessment and reporting	Improving student assessment and reporting refers to the ways the school collects, collates and communicates student assessment data to inform learning design and to report on student achievement.
6. Developing measuring and monitoring student ICT capabilities	Developing measuring and monitoring student ICT capabilities refers to how the school supports and collects evidence of students' confidence, engagement and skill in using ICT, and uses this data to improve learning programs.
7. Accessing and utilising student information	Accessing and utilising student information refers to the school's use of ICT to manage all student information as a single, integrated, interoperable system across the school, for efficient communication with external bodies and institutions.
8. Providing, accessing and managing teaching and learning resources	Providing, accessing and managing teaching and learning resources refers to the school's systems for planning for, selecting, creating, storing, retrieving, and making use of digital learning and teaching resources in all learning areas across the school.
9. Automating business processes	Automating business processes refers to the school's planning and implementation of ICT systems across the whole school and how they support and improve the school's business processes.
10. Providing reliable infrastructure	Providing reliable infrastructure refers to the school's planning, implementation, ongoing maintenance and development of ICT infrastructure that meets the full range of learning, teaching and administrative needs across the school.

Table 2.2: Making change happen Framework (Learning in an online world 2008, p6)

The proposed framework has key components that can enhance the implementation and development of ICT in education. The current study will investigate these elements in Saudi schools, not only of students, as in this framework, but also of teachers and headmasters.

Australia focus mainly on process that can effect change from learning to administration. It has some aspects that compares with Singapore but here processes are key in the 'making of change' strategy.

This is very critical for Saudi Arabia where there are limited studies that show robust processing at all levels from implementation, support, and follow-up at infrastructure as well as delivery and evaluation. Processes and procedures are aspects that areas very crucial in this strategy and some of these aspects are discussed in chapter three.

The United States, as one of the most developed and industrialised countries in the world, is a step ahead in utilising ICT tools in its education system. What distinguishes its policy is its focus on the principle of collaboration between different parties, as well as building databases that can be used to personalise instruction, support decision-making and the allocation of resources, and promote accountability and follow-up (U.S. Department of State, 2012).

In addition, attention is paid to creating an attractive learning environment extending to its borders to make education mobile and flexible, making it available and effective for learning acquisition, both in the institutional setting and at home. Furthermore, teachers and students are encouraged to search online by providing a high quality service in online content (Patrick, 2008).

In 16 Latin American countries, studies conducted, in 2006, with more than 200,000 students and almost 5000 schools. The aim was to examine the schools' infrastructure and facilities through the data reported by headmasters and teachers as well as students' performance and characteristics, which reported by parents. Findings indicated that the presence of spaces that support teaching (libraries, computer labs and science); the access to potable water, drainage and bathrooms as well as the connection to electric and telephone utilities are most significantly linked with learning outcomes (Duarte et al. 2011).

It can be concluded that US had built its ICT strategy on bringing all parties together. Hence, collaboration has been highlighted as key in ICT implementation, which will discuss in Saudi educational context.

Similarly, an excellent model and rationale for ICT provision in schools is provided by the Digital Strategy for **Irish** Schools, which was initiated in 2015 as a government action plan to ensure the effective implementation and integration of ICT within school learning, teaching and assessment by 2020. The goal is not simply to improve the use of ICT, but to fundamentally

improve the quality of all teaching and learning within Irish schools, in a way that also integrates its use with further and higher education (Department of Education and Skills, 2015).

To achieve this, base-line data was collected on the current use of ICT by teachers and schools, after which a consultative paper was published, Building Towards a Learning Society: A National Digital Strategy for Schools, and a public consultation organised with stakeholder groups, including both individuals, organisations, and school students themselves, with their resulting views and feedback, alongside international research, forming the content of the strategy (Department of Education and Skills, 2015).

The strategy has been developed around four key themes:

- Theme 1: Teaching, Learning and Assessment Using ICT
- Theme 2: Teacher Professional Learning
- Theme 3: Leadership, Research and Policy
- Theme 4: ICT Infrastructure

(Department of Education and Skills, 2015, P.6).

Primarily, it was concluded that it is essential for all stakeholders to take full responsibility, by being proactive and taking a leadership role in order to ensure that ICT is fully incorporated into all current teaching, learning and assessment practices in a way that enhances overall learning. This provides some thought-provoking questions that can be applied to this research in regard to ICT stakeholders.

The factors that can be deduced from the Irish policy include the assessment of the use of ICT in education, preparing teachers to become professionals in the use of these tools by paying attention to the role of school leadership, and the provision of appropriate infrastructure. These are all key factors that can contribute to making the application of ICT more successful. The Irish strategy focuses on improving quality of teaching and the focus is on the teacher, tools as well as leadership.

Some countries, like **New Zealand** and **Finland,** place in their economic, social, and education policies, a very high importance on collaboration and knowledge sharing. The Finnish Information Society Programme envisions a society in which expertise and knowledge form part of the culture and also the significant factors for production. Kankaanranta (2005) explains that as part of this programme the Ministry of Education in Finland developed an information strategy for research and education.

In New Zealand too, the government adopted in its strategy towards ICT in education the principal of cooperation between the Ministry of Education and schools. Its framework takes into consideration the issues of those working and studying in educational environments, and on top of this, it is in line with the country's E-government and National Digital Strategies, offering the basis for dynamic e-education to be integrated into New Zealand learning practices (The Ministry of Education in New Zealand, 2015).

To summarise, New Zealand and Finland policies share the elements of universal ICT integration, linking education, economic and also cultural modification approaches, in the work and study environment. All these can add value to the Saudi context, given that there are many aspects of ICT strategies and policies, which can be taken from the experiences of the developed countries. Therefore, this study aims to examine the important factors that have been identified in these policies, to see how they could be applied in the case of Saudi secondary schools. The next section examines the use and implementation of ICT in developing countries.

2.4.2. ICT in Developing countries

In contrast, some developing countries have also created some promising initiatives which take advantage of the possibilities offered by ICT. In **India**, for example, one of the most fundamental concepts of ICT involves the creation of a competent human capital. They have therefore adopted a programme since 1991 aimed at reconstructing the existing system of tertiary and vocational education through the integration of ICT tools to reinforce the acquisition of human capital, in its STP policy (Software Technology Parks). India's education policy aims to create an environment of collaboration by motivating and enabling a wider participation of society. This government-oriented ICT policy has transformed the national curriculum into an ICT-oriented education curriculum (Colclough and De, 2010).

The main characteristic of Indian ICT education is that education in programming is performed first, which means that students are taught how to program software earlier, and education in the application of ICT is offered at a later stage (Halewood and Kenny, 2008). India also aims to promote open and free access to the internet, by enabling all ICT resources to be available for all school staff members (Davis and Walters, 2011).

Chile and **Taiwan** are further examples of how developing countries have incorporated effective ICT programmes to improve overall development. In Chile, the ICT programme includes training teachers in its use, offering an educational portal on the web and, most importantly, increasing access to digital resources and the internet to all schools.

By 2004, 80% of Chile's schools had been equipped with digital resources, and 55% had internet access (Laval and Hinistroza, 2002; Hepp et al. 2004),

Likewise, the Taiwanese government has decided to support this worldwide trend. Thus, the Ministry of Education has declared the integration of ICT tools in education as the number one priority in an attempt to improve general educational provision, in order to strengthen Taiwan's human capital, and to ensure the country is compliant with the requirements of the global market (Young and Ku, 2008). Since the 1990s, in fact, Taiwanese educational institutions have participated in the process of creating a common ICT infrastructure through equipping their computer labs and educating their teachers to fully utilise ICT opportunities (Young and Ku, 2008).

What can be deduced from the cases of India, Chili and Taiwan is that policies related to the development of ICT as a subject, and the effective incorporation of ICT, are extremely important in government plans for future development. Thus, rather than ignoring or delaying the concept of modern technologies taking over learning and teaching, they are engaging with this vast phenomenon and presenting strategies which match other more developed countries (Cox, 2006). This approach allows the current study to apply the similarities between these developing countries and that of Saudi Arabia to assess to what extent Saudi Arabia is attempting to improve its ICT implementation for its further development.

Looking towards the Middle East, the **United Arab Emirates** is home to the one of the fastest growing ICT industries (World Economic Forum, 2015). Thus, the UAE Vision 2021 relies on building a knowledge-based economy and the creation of high-level human capital though innovation and technology advancement (UAE Vision, 2015). This vision focuses on enhancing the growth of the economy and education, relying primarily on developing an infrastructure of information and communication. Efficient connectedness and access to knowledge created by various digital appliances are regarded as the key drivers for the acquisition of human capital, meeting the requirements of the global market (UAE Vision, 2015).

Furthermore, to ensure that the programmes developed in its schools comply with international standards, with a particular focus on introducing the latest ICT materials at all school levels, the overall goal of the Ministry of Education is to bring qualitative improvement in the education system. Moreover, a major initiative, which took shape in 2012, entitled the Smart Learning Programme, intends, by 2017, to shape a new learning environment in public schools through the launch of smart schools that will provide every student with a smart tablet and

access to high-speed 4G networks, so it is not surprising that UAE's students are the second highest in the student happiness index in the world (UAE Vision, 2015).

For its ICT strategy (2012-2017), **Egypt** has effectively improved its ICT implementation, primarily by choosing a cooperative, collaborative approach. The ICT sector began to earn a sound reputation, both regionally and internationally, due to the efforts of the Ministry of Communication and Information Technology (MCIT), which was established in 1999, and has since played a significant role in the country's development, both in human, social and economic terms, and in its transition to democracy. The National ICT Strategy focuses on the sharing of responsibilities by all stakeholders within an ethos of cooperation and partnership, including public, private, and government organisations, both regionally and nationally, aiming to promote full participation and engagement in the sector, to ensure not only the future of the sector itself, but also recognising its benefits to the whole of society (Egypt National ICT Strategy, 2012).

Jordan provides a further example of an education ICT policy based on economic priorities. Due to the need to address the country's consistently high rates of unemployment and poverty, a programme of economic and social transformation was established by the government in 2001 in order to develop a knowledge economy, alongside high value-added sectors, recognising the importance of developing the country's human resources as a priority.

As a result, a programme, entitled the Educational Reform for the Knowledge Economy (ERfKE), was established in 2003, which set out to nurture and develop creativity and innovation among learners, aiming to ensure this by providing a learning environment conducive to developing skills and abilities that could then be adapted to problem solving in the wider system, and a curriculum that combined traditional elements, with a focus on knowledge creation and management through the use of ICT (Kozma, 2011).

In general, the education policies of the UAE, Egypt and Jordan focus on an investment in human capital and on choosing a cooperative and collaborative approach by applying ICT tools in the education sector. However, developing countries need to look at aspects that have made developed countries achieve a lot of progression in ICT sector.

What is clear is that there need to be processes and procedures as well as policies and collaboration of all involved. While ICT should adopt a more universal approach that integrated, education, human capital, economy as well social structure (Ferrer, 2009). These factors are discussed in the proposed study framework.

The following table summarises the main factors from the previous policies and strategies.

Country	The core elements	
USA	▪ Quality of ICT tools and ICT as a subject ▪ Collaboration and involvement of the various parties	▪ Promoting an attractive learning environment ▪ Development of ICT infrastructure and facilities
United Kingdom	▪ Sharing solutions between all parties ▪ ICT infrastructure ▪ Building a knowledgeable society based on ICT	▪ Alterations in the structure of conventional schools ▪ Universal availability of ICT tools
Australia Strategy 2020	▪ Infrastructure ▪ Policies on planning	▪ Online content ▪ Teacher training
New Zealand	▪ Cooperation ▪ Availability of connectivity and computers	▪ Distance learning ▪ Online content ▪ Software and maintenance
Finland	▪ Collaboration ▪ Knowledge sharing ▪ Developing information society skills	▪ Open education and research networks ▪ Development of educational information products and services
Singapore	▪ Integration of tools ▪ Promoting life-long learning	▪ Teacher development ▪ Infrastructure
Irish	▪ Connectivity ▪ Infrastructure	▪ ICT curriculum ▪ Focus on leadership
Finland	▪ Expertise ▪ Knowledge sharing	▪ Collaboration
India	▪ Reinforcing the acquisition of human capital ▪ Focusing on education in programming	▪ Reconstructing existing systems
Chili	▪ Training teachers in ICT ▪ Offering an education portal on the web	▪ Increasing the access to digital resources ▪ Internet available to all schools
Taiwanese	▪ Equipping computer labs ▪ Educating teachers in fully utilising ICT opportunities	▪ ICT-based educational reform ▪ Common ICT infrastructure
United Arab Emirates	▪ Knowledge based economy ▪ Innovation and technical advancement ▪ Compliance with international standards	▪ Provision of up to date tools for each student (e.g. tablets)
Egypt	▪ Infrastructure ▪ Focus on curriculum	▪ Distance learning ▪ Eradication of illiteracy
Jordan	▪ Knowledge economy ▪ Educational reform program	▪ Focus on knowledge creation ▪ Management through use of ICT ▪ Collaborative and cooperative approach

Table 2.3: ICT policies in different developed and developing countries

From the foregoing, it is clear that many developing and developed countries are making every attempt to activate the use of ICT tools in their education systems. However, although they have invested massively in this sector, the progression has often been disappointing, resulting in a number of serious questions being raised for decision-makers and educators alike (Twining, 2007). One of the most important questions concerns the factors which affect the successful implementation of ICT in schools.

The following section discusses some teaching and learning theories and models in using ICT in education, in order to identify additional critical factors for effective ICT implementation,

which can add to the factors that are gathered from the previous policies and strategies to form the study conceptual framework.

2.5. ICT MODELS AND THEORIES

There are many different social and psychological factors involved when interacting with technology, which may impact user behaviour and acceptance (Taiwo and Down, 2013). One of the objectives of the current research is to identify factors that may hinder or facilitate ICT implementation. Therefore, this section aims to review the literature of the popular models and theories which have been acknowledged as applicable to today's technology developments within the context of ICT.

- ***Technology Acceptance Model (TAM [1])***

Before addressing to the Technology Acceptance Model (TAM), it is worth mentioning that this model is based on the Theory of Reasoned Action (TRA), which was developed at the late 1960s by Martin Fishbein, and reviewed and extended, in the decades that followed , by Fishbein and Azjen (Ajzen &Fishbein 1975). This theory explains the relationship between behaviors and attitudes within human action. This theory relies on two variables.

First, 'individual's attitude', which predict that the individual's attitude towards a given situation links with the (second variable) 'subjective norms' to shape the behaviour intention, which in turn influences the individual's actual behaviour. Furthermore, it links the perception and attitudes to the intentions of people in making a decision, which may result as a consequence of this intention (Ajzen & Fishbein, 1991).

Hence, this theory has acted as a starting point for Technology Acceptance Model, which was developed by Davis in 1986, with the purpose of exploring further the interaction between the behavioural and technological factors. These include the attitudes and motivational factors which are involved in accepting or rejecting technology. This model suggests that the user's attitude to using technology is primarily affected by its perceived usefulness to his or her performance, and ease of use (Davis, 1989) (See figure 2.2).

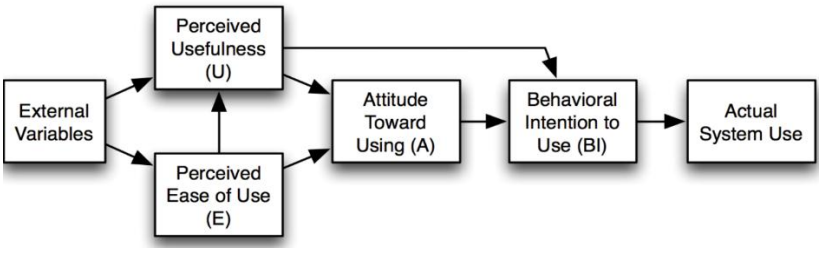


Figure 2.2: Technology acceptance model (TAM) (Davis et al. 1989)

The TAM model suggests that intentions and subsequent behaviours are based on beliefs about the likelihood of achieving the desired outcome, based on attitudes towards the action and subjective norms and the social pressure to perform the action. Its main advantage lies in its pragmatic application, in that system designers can control these two factors related to use (Wu et al. 2011), and so evaluate the effectiveness of technological applications before their implementation, thus enabling system developers to predict the intention and actual use of their systems (Shroff et al. 2011). This model is extremely important in developing understanding in the relationship between pedagogy, technology and epistemology in order to develop the use of ICT further.

The TAM model clearly provides an excellent starting point for the exploration of ***attitudes and motivational forces*** towards using ICT, and it has been acknowledged as having validity, reliability, strength and relevance in its ability to predict behaviour in many areas within ICT (Legris et al. 2003; Sharma and Chandel, 2013). In addition, it has made an enormous contribution theoretically to the exploration of the connection between ICT usage and acceptance (Galletta, 1999; Chen and Li, 2011), resulting in its widespread use within ICT and its recognition as a highly significant theory

However, the model has received criticism as being too simplistic, due to its lack of variables and, as a consequence, there has been much research into incorporating other variables into the model (Venkatesh & Davis, 2000). The main argument against this model is that social influence and subjective norms were not included, which are considered to be crucial, as they indicate whether usage behaviour is dependent on the attitude of the user of the intention of others (Wu et al. 2011).

In this study it is important to verify the ICT users' perceptions (views and attitudes) towards these tools, questioning whether ICT tools are considered to be useful and easy to use. This might help to understand why some teachers reject the use of ICT tools in the classroom, which in turn forms their attitudes and behaviours towards accepting or rejecting these tools in their lessons.

- ***Development of Technology Acceptance Model (TAM ^{2})***

In order to address previous shortcomings and criticisms of TAM**1**, TAM**2** was developed by Venkatesh & Davis (2000). This incorporated the additional variables of social influences and cognitive instrumental processes into the perceived usefulness framework of TAM**1**, but removed the variable of attitude (Wu et al. 2011). These social influences consist of subjective

norms, voluntarism, defined as the extent to which the use of technology is considered to be voluntary or obligatory, and images, which is the belief in the value of its use. The cognitive instrumental processes include its relevance to the job, its applicability to the demonstration and quality of results, as well as the aforementioned perceived usefulness. In addition, the experience of the user was considered to be another variable (See figure 2.3).

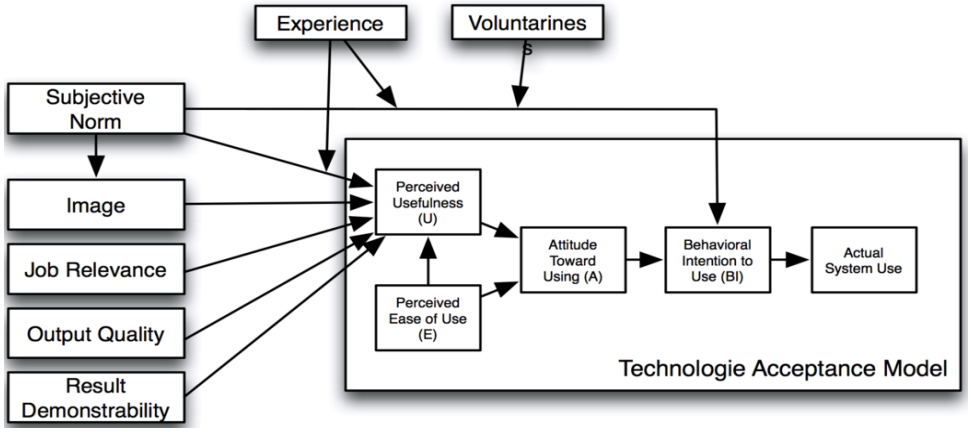


Figure 2.3: Technology Acceptance Model (TAM [2]) (Venkatesh & Davis, 2000, p.188)

However, subjective norms were found to be higher influencers than ease of use and perceived usefulness, when the use of technology was compulsory. It was also found that over time the use of technology relied more on the benefits to job status, to achieving outcomes and its relevance to the job itself, rather than factors related to social influence. This indicates that in the development of the process of ICT implementation, approaches based on these motivating factors are more appropriate than those based on compliance, although these might be appropriate at the initial stages of implementation, which demonstrating its affordances practically by comparing its effectiveness with a prior system might encourage acceptance.

To sum up, as this model suggests that the social influences are compose the subjective norms of technology user. Therefore, studying the social influences, which likely in Saudi Arabia is culture and religion, which in turn affect the users' images (perceptions and belief in ICT value and the benefits to job status), as well as their experiences, is critical. In addition, the approach of using ICT in the Saudi education context (voluntary or obligatory) is also an important factor. Thus, the current study will examine all these factors as they are relevant to the current study objectives.

- ***Theory of Planned Behaviour (TPB) (1991)***

The Theory of Planned Behavior (TPB) is a theory that connect behavior and beliefs, was developed by Ajzen (1991) in an attempt to explain the complex psychological processes

involved in human behaviour and to address the issue of perceived behavioural control, which was lacking in TRA. It is one of the most predictive persuasion theories. It has been used to studies of the relations among attitudes, beliefs, behavioral intentions and behaviors in various situations. It states those subjective norms, attitude toward behavior, and perceived behavioral control, together shape an individual's behavioral intentions and attitudes. Its premise is that the stronger the intention or motivation, the more likely the action will be carried out, but this necessarily depends on how much that behaviour is perceived to be under individual control.

This can be defined as the ability and confidence to carry out the activity, how easy it might be perceived to be, past experience regarding this activity, and the resources and opportunities available. This is very much linked to Bandura's (1986) concept of self-efficacy within the social cognitive theory. The theory includes three determinants of intention, the positive or negative attitude towards the activity, subjective norms or the perceived pressure the individual is under to carry out the behaviour, and the perceived behavioural control.

This issue of control clearly has significant implications for the classroom teachers in the current study, as clearly a perception of a lack of control, which might include training, resources and confidence, will affect the uptake of ICT tools (Oyaid, 2009).

Other researchers have also highlighted the importance of perceived control, finding that it has a far more influential effect than social factors, and according to Godin and Kok (1996), who researched in personal norms, which can be defined as the role identity or the belief of how to act within the role, along with moral norms, which are feelings of personal responsibility. These factors are clearly important in teachers' acceptance of technology, in relation to their need to be a role model, showing responsibility and high moral and ethical standards.

If ICT implementation is aligned to these beliefs, then they are more likely to accept ICT usage. In a society such as Saudi, beliefs is not only tied to religion, it is also a way of life and relates to what people do, how they feel and responsibility they take. This theory is crucial in advancing ICT implementation as affect acceptability of ICT. Therefore, the study aim to examine individual's behavioral intentions, views and beliefs towards ICT integration in education.

- ***Model of PC Utilization (MPCU)***

The computer utilization behaviour model was developed by Thompson et al. (1991), who suggest that people behaviour is determined by what they would like to do (attitudes), what they think they should do (social norms), what they have usually done (habits), and by the expected consequences of their behavior.

Examining this model, which has six significant factors (See figure 2.4), Thompson et al. (1991) found that although the affective components of attitudes were not significant, the cognitive components were extremely important, especially the short term consequences of complexity and job fit.

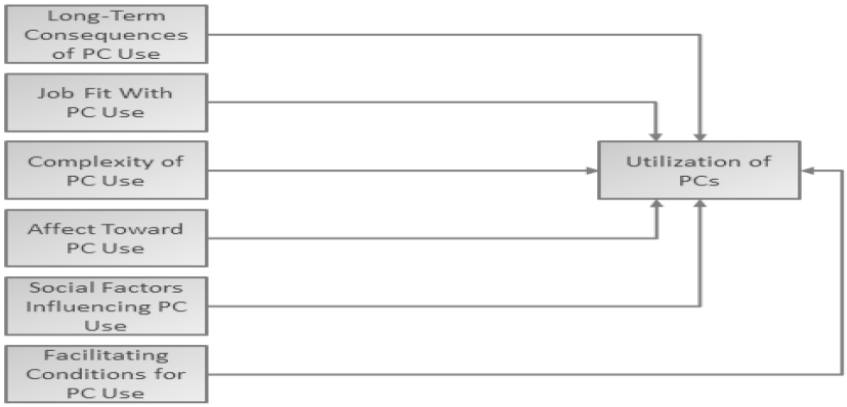


Figure 2.4.: Model of PC Utilization (MPCU) (1991)

Interestingly, it is suggested that these controllable factors should be prioritised in encouraging ICT implementation, such as providing training on the effectiveness of ICT within teaching methodology, ensuring adequate guidance is given in using ICT to reduce the issues of complexity, and the use of enthusiastic role models to promote its use, similar to Bandura's social cognitive theory (1986). In this way, the crucial factor of job fit can be addressed.

Al-Khaldi and Wallace (1999), in using this model in their study, suggest that computer utilisation is determined by individual attitudes, facilitating conditions, such as computer access and social factors, as well as personal characteristics, such as computer experience.

This study uses this model factors to examine them in the Saudi context, especially the social factors such as religion and belief towards using the Internet in education. In addition it will use to investigate the relationships between end-users' attitudes and ICT utilisation among school staff, and thus to gain a better understanding of the factors that influence the use of ICT. This model look at the social, internal factors as well as user attitude, these enables the study to explore not only the utilization but what can or hinder this hence relevant to the study objectives.

- ***Motivation Model (MM) (1992)***

Interestingly, rather than focusing simply on usefulness as an influencing factor in the use of ICT, the Motivation Model (MM), which extends the psychological factors of TAM to motivational factors, also highlights enjoyment as an important contributor (Davis et al. 1992).

This model identifies that substantial motivation, which can be defined as an internal desire to initiate and complete an action, linked to subjective feelings of enjoyment and fulfilment (Vallerand, 1997), can be connected within the context of ICT to feelings of playfulness and satisfaction (Venkatesh, 2000), whereas external motivation, which originates from an external source (Cheng & Yeh, 2009), can be determined by how easy and useful a task is perceived to be, alongside subjective norms. Ease of use can clearly affect enjoyment, which is also linked to self-efficacy, confidence and competence, which are important components of intrinsic motivation, thus indicating a positive relationship between intrinsic and extrinsic motivation.

Vallerand (1997) indicates that most enjoyment is gained from using ICT when it is considered to add value and to be useful, and this has a positive impact on acceptance. Clearly, enjoyment is an important component of classroom teaching, both for the teacher and for the learner, and focusing on this area as a motivational factor seems an interesting avenue to explore.

A further adaption of the model was developed by Galletta (1999), to address the issue that previous TAM models did not focus sufficiently on social influences, adding to the model the construct of psychological attachment, acknowledging the importance of raising positive attitudes through internalising and identifying with the new technology. This aspect of internalisation, interestingly, was found to be more influential than the perceived ease of use.

This is clearly significant for the current study, as mentioned earlier in Australian government strategy (2010), regarding encouraging teachers to use technology by allowing them to be fully involved in decision making, so that they themselves can invest in the process, and to ensure that they are made fully aware of its benefits. This will increase feelings of identification and internalisation with the ICT implementation process, which are important components of intrinsic motivation, and, according to this model, are more effective than using extrinsic motivational factors, which might result in users feeling that the technology is being forced upon them. To implement any learning, both teachers as well as learners need to be motivated.

Factors of this model are relevant to the study objective, which aims to understand how teachers can be motivated to train engage and implement ICT in classroom.

- ***Social Cognitive Theory (SCT) (1986)***

Another important contributor within this area of research is the Social Cognitive Theory (SCT), introduced by Bandura in 1986, which highlights the social environment in which learning takes place, suggesting that personal, behavioural and environmental aspects all

interplay mutually, and impact future behaviour, with individual behaviour affecting the environment and the environment reciprocally affecting performance (Bandura, 1989).

This seems to offer a clear indicator both of the importance of making full use of ICT due to its high presence in the outside world, and also the responsibility of teachers to enhance the learning environment by offering ICT based learning, which clearly has a mutually beneficial effect on both teacher and learner (Pelgrum, 2001; Bingimlas, 2009; Al Asmari, 2011).

The importance of developing self-efficacy, or self-direction, is another concept introduced by Bandura (1986), which is clearly applicable to both teacher and learner within the context of this study, especially in a world which requires constant adjustment to change. Indeed, Bandura (1989, p. 66) comments, "the task of creating learning environments conducive to development of cognitive skills rests heavily on the talents and self-efficacy of teachers". This highlights the importance of the classroom teacher being skilled, competent and fully trained in ICT in order to be autonomous in the classroom.

- ***Combined TAM – TPB (1995) – the decomposed TPB model***

Blending together the concepts from TAM of perception of usefulness and ease of use, the behaviour prediction factors from TPB, and aspects of the diffusion of innovations perspective, the combined TAM-TPB model was developed by Taylor and Todd (See Figure 2.5).

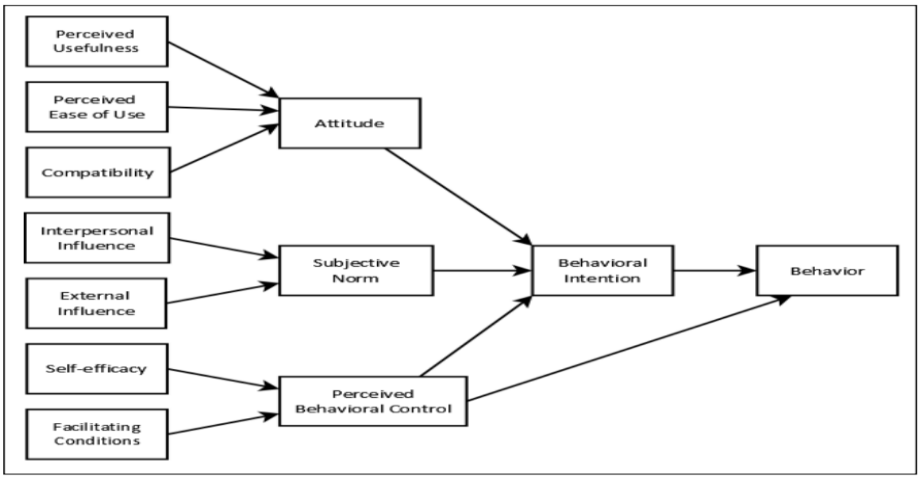


Figure 2.5: The Decomposed Theory of Planned Behavior. (Taylor and Todd, 1995)

By creating a stable set of beliefs that would be more relevant to the use of control as indicators of attitude, three significant factors are most commonly used, based on the characteristics of an innovation identified by Rogers (1995), namely, its relative advantage, indicating how its adoption might enhance performance and the environment and thus benefit the individual in terms of job performance or financial reward; its complexity, which includes the ease of use

factor and its compatibility, how it can be accommodated with current needs, past experiences and individual beliefs and values; and finally how consistent and relevant it is to work practices, and outcomes.

Three significant influential groups are also incorporated into the model: peers, superiors and subordinates, recognising the importance of each of these in modifying attitudes and intention. Also important in the model is self-efficacy and facilitating conditions, which include factors that might restrict use, such as time and funding, which are said to inhibit use. However it is suggested that such positive factors may not in themselves encourage use, suggesting that beliefs are more important than resources. Clearly, as the affordances that technology offers to the practitioner increase, and the complexity of its use diminishes, attitudes will become more positive.

This model has significance in providing a detailed explanation of intention and behaviour, and it has particular value as a diagnostic model in new implementations, as it provides specific beliefs and attitudes that can be targeted by management. Its particular focus on normative beliefs, such as the need for communication, participation and support, and on self-efficacy, which can be related here to the need for identifying and providing effective training, and on facilitating conditions, makes it highly relevant to this study, with the reinforcement of the message that changing attitudes and beliefs is fundamental to the uptake of ICT in the classroom.

In conclusion, from this analysis of the origins and developments of TAM models and additional technology models and theories, it is clear that TAM provides a robust model which has been successfully applied across a wide range of contexts and situations of end-user computing technologies, including learning environments, to develop understanding in the use of technology and user behaviour, and thus to evaluate and predict its adoption and use in educational settings.

The last models are holistic and applicable to the study context as they do explore both internal and external factors but also looks at behaviour, beliefs as well as social norms all which are key in Saudi context and this study objectives in particular.

2.6. THEORIES IN ICT INTEGRATION IN EDUCATION

A growing number of theories and studies have confirmed that the application of ICT in education is not just an application that can simply be evaluated once and for all, but is rather a large and complex mass that has extensions in many phases, its participatory processes, which

affect by many factors (Son, 2011; Tinio, 2012). Therefore, many educators (Ertmer, 1999; Becta, 2003; Stucki, 2009; Tiemo, 2012), have categorised these factors (that affect ICT application in education) into two main categories: internal and external factors.

Within this context, Al-Alwani (2005) described internal factors as those associated with people in an organization, (school level), such as headmasters, teachers and various staff roles, views and attitudes. External factors, in contrast, are those associated with factors outside of the organisation, which refer in this study to the government level. For example, providing ICT tools, training, as well as the linkages to the national policy and socio-economic development (Becta, 2003).

Based on this classification, the discussion of factors affecting ICT implementation in schools will be presented in two categories: factors related to the government's role in ICT and factors related to the schools themselves. At the end of this section, there will be a summary of the most important factors emerging from the literature, which will be used to frame the study theoretical framework.

2.6.1. Issues at the Governmental Level

- ***Clear justification for ICT incorporation***

According to Vallance et al. (2009), one of the major factors that can account for the ineffective implementation of ICT in education is the lack of clear justification in government policy, for the purpose of ICT incorporation in the classroom. This view is supported by Al-harbi (2014), who argues that in spite of adopting ICT in instructional practices, educators have often conducted this with only limited knowledge and a lack of solid understanding of how the technologies can enhance learning, and with the absence of clear guidelines how to effectively integrate it into classroom practices.

In a similar vein, Twining's research (2007) presents particularly interesting findings for this study, as it locates a deeper underlying issue in the incorporation of ICT. He argues that a lack of common vision about the value of technological tools in education explains why despite substantial investments in educational technology, the desired benefits are yet to be realised.

The results of Twining's study, which originated from respondents from 94 countries, established three broad justifications for the adoption of ICT resources in the classroom: enhancing technological literacy, supporting learning, and boosting productivity. This recognises the importance of the role of governments in ensuring that clear policy guidelines

are developed, which can then be easily implemented and followed, but, more importantly, understood by the teachers and headmasters (Twining, 2007).

- ***Singling out an educational problem***

According to Al-harbi (2014), the successful implementation of ICT in teaching and learning starts with singling out a specific educational problem. In other words, the government should realise that the need to adopt ICT in the classroom should be grounded in dissatisfaction with the status quo and the desire to improve the educational opportunities provided to students. This view is supported by Hakami et al. (2013), who posit that it is important, firstly, to identify the objectives of the curriculum and the desired outcomes, as a clear understanding of the educational problem enables educators to choose the most appropriate ICT tools to address the identified need, paying attention to their merits and demerits.

As Al-harbi (2014) asserts, educators cannot effectively utilise ICT in the classroom without a clear understanding of the most appropriate ICT tools. It is also important for educators to note that a greater availability of ICT tools in the classroom does not necessarily translate into productive learning or lead to improved academic achievement, an issue which has been validated by studies, which have clearly demonstrated that no direct relationship exists between ICT utilisation and positive learning outcomes (Balanskat et al. 2006; Wozney et al. 2006).

This case called "technocentric thinking", which refers to a popular belief among headmasters and teachers that is focused on technology rich environments by equipping the schools with the latest ICT tools. Ethnocentric thinkers believe that technology itself can make change and make a learning environment better (Bers, 2008), which should be avoided; otherwise, the whole concept may be a waste of resources (Al-harbi, 2014).

- ***Promoting a constructivist learning environment***

Another aspect of successful ICT implementation is that the government should promote a constructivist learning environment (Pedersen and Liu, 2003). Therefore, governments should play the role of urging educators to shift from the conventional teacher-centred classroom to more student-centred learning, which is referred to as constructivist learning (Roblyer and Doering, 2010). In this way, as argued by Kirschner and Erkens (2006), students' critical, analytical, and cognitive abilities can be activated.

To promote a constructivist learning environment, the Final Study Report (2013) summarised most of the factors that can make the use of ICT in schools more successful, which should be taken into account by governments when adopting any initiative to apply ICT in education.

Firstly, a school should be well equipped digitally, which involves high connectedness, with access to fast broadband, the availability of facilities such as email, virtual learning networks, libraries, and websites, and, in addition, the provision of relevant equipment.
Secondly, the government should prescribe diverse measures to ensure the availability of ICT equipment at the moment of request. Therefore, the implementation of ICT should be viewed as a process, not a product (Yalin et al. 2007) a process that is sophisticated and dependent upon a myriad of factors (Afshari et al. 2008). This sentiment is well amplified by Bingimlas (2009), who argues that the integration of ICT into the classroom needs to address the barriers that may hinder the success of the various processes involved and that this is one of the government's major roles. Thus, Roblyer and Doering (2010) emphasise that the implementation of ICT is most successful when there are supportive processes in place.

Another issue is the school infrastructure, which is associated with the students' convenience. In addition, it's linked significantly as well as with learning outcomes (Duarte et al. 2011). Research by Engels et al. (2004) shows that small advantages in infrastructures can lead to great advantages, specifically to vulnerable students. Therefore, school buildings should inspire learning, this includes well-designed, built on time and maintained places for teachers to teach and pupils to learn supported by ICT.

- ***Comprehensive and flexible policy***

As Kozma, (2005, p.11) stated, *"Simply putting computers into schools is not enough to impact student learning"*, because the successful involvement of ICT into the studying process requires thorough, strategic planning. Therefore, successful ICT policies and strategies should be holistic and cover a wide variety of issues to more effectively promote the use of ICT tools in schools. Furthermore, they should involve every form of criteria that can help to increase awareness and the understanding of the potential positive outcomes and benefits that can be achieved with regular ICT practices. In addition, an ICT policy should address the issue of collective learning and collaborative activities in the classroom.

Specifically designed ICT tools, such as group design, computer modelling, and scientific reasoning are aimed at supporting and easing problem-solving activities, thus assisting with structuring the process of problem investigation and solution through designing questions, response options, criteria, and the like (Beers et al. 2007). Since ICT is considered a tool for establishing a practice of global information and knowledge sharing, collective learning, which is likely to enhance discussion and the representation of results to others (Beers et al. 2007), is clearly facilitated by its use.

Almaghlouth (2008) in a study of Saudi secondary school science teachers' perceptions of the use of ICT tools to support teaching and learning observed that most teachers agreed that headmasters and teachers are ignorant of the ICT policy. The study showed that the lack of explanation of ICT policies had a negative impact, because headmasters have to apply them without fully understanding them, which is suggested as likely to result in not achieving the Ministry of Education's aims set for ICT in the country's education system.

- ***Providing ICT training***

Another factor that relates to the role of the government in ICT is training, as this plays a significant role in ICT implementation. In this context, many educators believe that training programmes should be included in education policies with the provision of appropriate high quality training programmes, as well as incentives to encourage teachers to engage in these programmes (Oyaid, 2009; Albugami and Ahmed, 2015a). However, as the times of the training sessions are sometimes inconvenient, the government should pay attention to its scheduling. Results from Albugami and Ahmed (2015b) show that most teachers agreed that planning training outside of working hours without any support (incentive), results in no attendance, which negatively affects ICT integration in classrooms (Tearle, 2003; Jones, 2002).

- ***Providing resources and support***

Another issue related to the government's role in ICT implementation is that of the provision of resources, which includes both human and financial resources and ICT tools, which, according to Newhouse (2002) is the most crucial issue. Newhouse's framework, which he created as a tool to monitor the impact of ICT within all areas of the school environment, argues that resource availability, or the lack thereof, has a strong relation to the curriculum.

Support is also a critical factor, whether technical support or supervisory support (Albugami and Ahmed, 2015a). This, in turn, supports, influences and provides logistics of how to deliver in terms of content, learning outcomes and pedagogy. However, Newhouse's framework also emphasises the thinking of Lim and Khine (2006), who point out that the availability of resources without technical support results in difficulties in ICT integration at the school level.

Newhouse adopts a systematic approach, with a view that all relationships have an impact on each other. For instance, the availability of ICT resources with financial resources, but without the human resources (skills or knowledge of teachers) to implement ICT in the classroom, implies there is unlikely to be a positive outcome (Newhouse, 2002).

As a result, teachers in some developing countries express reluctance to adopt new educational strategies because of their poor competence in ICT. For instance, in Saudi Arabia, one of the key constraints to implementing technologies in science education is said to be teachers' poor preparation in how to select and use ICT tools in teaching (Bingimlas, 2009).

In this matter, the preparation of a pre-service teacher is critical. Jones (2002) stresses that pre-service teacher training courses in ICT use should focus, at the very least, on three aspects: the individual skills that link to professional use; administration and organisational use; and techniques for effective teaching and learning practices. He concludes that if teachers are not able or willing to implement ICT for personal purposes, they do not use it for classroom teaching. Hence, the government role in this issue in providing every kind of support possible in the use of ICT resources is critical.

It is clear in the last section that there are vital and inter-linking factors that ensure the government can deliver ICT. The learning environment, tools, teachers and leadership are as critical as the curriculum and learning should aim at the schools' student and the general community. The Saudi government should look at ICT as crucial yet related multiple factors that need integration.

2.6.2. Issues at the School Level

- ***Headmaster's role and responsibilities in ICT***

The impact of the emergence of technology upon the education system had radically changed our old definition of the role of headmaster. The present dilemma has the proficient leaders to guide school teachers, as well as students, in an educationally suitable utilization of ICT, which leads to the critical definition of the roles of headmasters in ICT integration (Mulkeen, 2003; Schiller, 2003). Generally, the headmasters make the final decisions, and solve many of schools problems; but following the traditional role of the headmasters would result to leaderless schools in the technological era (Yuen et al. 2003).

With the development that has been achieved in the analysis of leadership role, there are different perceptions about what constitutes leadership and leadership effectiveness. According to Aabed (2006), the effectiveness of leadership is suggested to be reliant on the leader, the supporters and the conditions, and is calculated by the leader's involvement in the value of group processes and the degree to which the organisation carries out its tasks and goals productively. Similarly, Deanne and Paul (2013) cite three different leadership approaches used by the school's leader: situational leadership, participative leadership and transformational

leadership. Headmasters clearly have many responsibilities in ICT implementation. The following sections discuss these roles and responsibilities.

- ***Creating an attractive school environment***

Arguably, different leadership approaches that are used by the school leader have a significant influence on the school staff as well as the implementation of technology in the school. Wong et al. (2008) found that if the school leader provides support and encouragement to the teachers, a favourable working environment can be created to motivate teachers to experiment with ICT in their classrooms. Consequently, the school leader should adopt a style of management that promotes ICT implementation in an effective working atmosphere, in which teachers are given responsibility.

Two theories of management are hence proposed, theory **X** and **Y** (McGregor, 1960). The Theory X style of management involves an authoritarian and repressive approach, whereby managers assume that employees are submissive, lazy, irresponsible and resistant to change. Theory X managers do not give their employees the opportunity to fulfil personal needs, resulting in the creation of a depressed working atmosphere, which leads to low productivity.

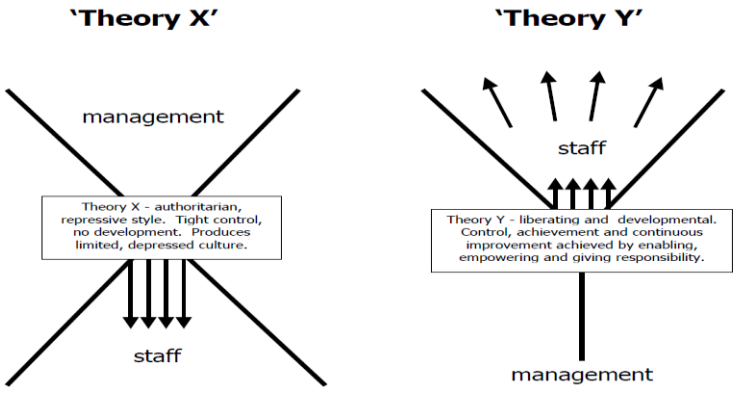


Figure 2.6: The difference between X and Y theories (McGregor, 1960)

The Theory Y style of management is a more relaxed approach by the school leader/manager in which staff are encouraged to develop and shoulder responsibilities, which leads to them feeling more appreciated. In this context, and based on Theory X and Y, the optimum leadership approach would be in line with theory Y. In this approach, a harmonious working atmosphere is prevalent, productivity is increased and workers are more open to change.

The changes required for the success of ICT in schools also call for good leadership. The school leader should be able to demonstrate reform by investigating the relevance these changes have on the school and its teachers, and identifying with the teachers' needs. Mulkeen (2003) states that the school leader needs to be fully prepared before applying ICT in the school, addressing

any problem that could prevent ICT implementation, for example, by helping individuals (teachers and students) to understand the changes taking place and providing suitable ICT training courses for teachers.

However, negative attitudes or perceptions of the headmaster towards ICT, or a low awareness of the advantages that ICT can offer teaching, resulting in a negative role, are factors that can slow the successful implementation of changes in the education system (Oyaid, 2009). School leaders should instead set a good example for the staff, and the use of ICT for educational purposes by the headmaster will demonstrate to the teachers how to follow suit. So, for example, headmasters can use ICT presentations in assemblies, meetings and for open days, and also promote an effective use of ICT tools. On the other hand, if the headmaster only uses ICT for personal use, this will create a negative impact on the teachers (Papi. & Sidr, 2009).

- ***Controlling monitoring and assessing ICT use***

In his study of the role of school headmasters as facilitators of change, Schiller (2003) referred to their functions of developing supportive environments, arranging training, providing consultation and promotion, and monitoring and evaluating. Thus, headmasters should be regarded as the drivers of ICT implementation at the organisational (institutional) level. An effective headmaster performs three roles to facilitate this change. First, they should create and demonstrate a clear vision of the change, notably indicating the advantages of ICT implementation (Schiller, 2003), and, in addition, establish the expectations hoped to be achieved, which can favour students in an ICT-based strategy.

Secondly, in their role as a school administrator they should oversee the scope of managerial aspects of the school functioning, thus demonstrating responsibility for finding financial resources to equip the school with digital tools, creating ICT infrastructure, and developing and conducting training and educational sessions for teachers. Finally, headmasters should focus on the current concerns of the school community and the staff to ensure that making this change is an integral part of the education system, not just a separate intervention (Schiller, 2003).

Facilitating change in the beliefs and perceptions of the teachers is also an important role of a school headmaster when integrating the use of ICT tools in the classroom. This requires transforming teachers' traditional understanding of the educational process into a mindset that regards technologies as the key tool in reaching the set pedagogic objectives (Yuen et al. 2003), with the awareness that the use of new software and hardware materials requires the appropriate competence technology.

Thus, it is essential that a headmaster organises ICT training courses, to which the ICT coordinators are invited, and is constantly aware of the importance of this new educational policy. As a result, teachers are more likely to learn about the new activities and practices available in utilising ICT tools to reinforce student progress (Yuen et al. 2003).

There must also be emphasis given to the safety of the working and learning environment (E-Safety, 2011), the headmaster giving guidance on health and safety precautions for teachers and students. This can entail a number of factors, such as, for example, keyboards, display screens, visibility and chairs at the correct height. Student hours online may also need to be capped for health reasons. Ultimately the responsibility in this matter lies with the headmaster to ensure equipment is safe to use, then with the teacher and student to take responsibility for their own health and safety and that of the other users (E-Safety, 2011).

Moreover, the headmaster should play a role to provide an appropriate space to use ICT tools. Space is a key issue regarding ICT labs or computer rooms in schools. Students need to have the relevant space to work and move around. Gipson et al. (2003) stated, lack of space can result in teachers neglecting to use equipment, as the school lacks appropriate designated sites for ICT hardware.

However, Leadership development and support were inadequate in the past several years. School heads ignored the additional pressure on teachers instigated by ICT adoption. A great deal of time was exhausted on the infrastructure rather than curriculum integration. Likewise, some school heads thought that investing in top-of-the-line facilities or absolutely costly hardware/software implies technological advancement (Chung et al. 2005). Headmasters are held accountable for an extensive array of tasks and achievement criteria, in times devoid of the associated authority, while coming across government policies and rising community expectations. Although some school heads conform to ICT implementation, they do not have a scrupulous vision and strategy to incorporate ICT in education (Chung et al. 2005).

This study focuses on the Saudi headmasters' roles towards ICT in schools, and to what extent they are facilitate or hinder ICT implementation.

- ***Teachers' role and responsibilities in ICT***

  - ***Developing their ICT skills***

The role and practices of teachers in using ICT tools in classroom activities is crucial, as its success depends on every individual teacher's desire, understanding, and competence. Thus, teachers are the key source of change and modernisation in the education system, since they are

the drivers of ICT promotion (Thokchom, 2013). Today's teachers frequently refer to their reluctance to use ICT tools in the classroom, as due to their belief that their skills are poorer than those of their students. In addition, their anxiety over their potential failure can evoke a denial of the usefulness and effectiveness of ICT in education. In contrast, teacher confidence in using technologies can support their beliefs in the contribution of these technologies to teaching and individual development, and the necessity to expand the application of ICT in the future (Bingimlas, 2009).

The process of ICT implementation has also modified the role of a teacher; today's educator is required to possess additional skills and competencies, besides the traditional classroom teaching responsibilities. The issue of teacher competence and confidence in their knowledge about technology is even more acute in developing countries where *"technology is still an imposed and novel outsider in the pedagogy of schools"* (Watson, 2001, p. 251).

Consequently such countries can face serious obstacles in the implementation of ICT in education. In most developing countries' schools, for instance, teachers lack training in selecting and using ICT tools for the learning process. Furthermore, many of the existing educational courses provide training in computer use with no reference to the purposes of education. Thus, teachers are often not able to apply their technology skills in their teaching performance (Watson, 2001).

Therefore, teachers should be encouraged and motivated to take training courses in ICT use, which should provide guidance in helping them choose and apply ICT tools throughout the pedagogic process. In this way, it should be possible to improve the ICT capability of teachers to enable them to use ICT tools as an integral part of the educational process and to assist them with developing the ICT capability of learners (Bingimlas, 2009; Mumtaz, 2000).

- ***Teachers' pedagogic training***

Despite the likelihood of already possessing a range of ICT related experiences, it is important that new teachers are introduced to theories and concepts that can assist them in understanding why certain events occur in the interaction between teacher and learner. While beginning teachers might focus more on classroom management and other 'survival' skills, as they spend more time in the classroom, they discover the need for theory to exist alongside practice (Jones, 2002).

Most classroom teachers are interested in knowing what and how their students learn. In pre-service teacher training programmes students study philosophical and psychological issues

related to knowledge and learning. However, in general, none of these theories and the educational issues they raise are discussed by students in the context of learning technologies in the classroom. Over the three decades that computers have been entering the classroom, educational theories have moved from behaviourism to cognitivism and then to constructivism. Underlying many of the theories is the concept of learners as individuals who have specific personal needs, while at the same time requiring social contact with peers and others. Therefore, Watson (2001) has urged that pedagogy should be before technology.

The CEO Forum (1999) and other recent reports on teacher education have identified the context of ICT to be a major issue of concern. This is because in the past there has been an over-emphasis on training student teachers to develop proficiency in a range of technical skills, then assuming that because they are technically competent in ICT, they will be able to use it in their teaching, as well as enable their students to learn more effectively.

This has not, however, turned out to be the case. It is apparent that the integration of ICT in education is a highly comprehensive process, requiring changes at all system levels. Teachers, as the providers of information and knowledge, should adjust to this new strategy to make their contribution to the learning process relevant (Thokchom, 2013). Therefore, education systems need to modify teacher training programmes and training in pedagogy to create a new generation of educators. Promoting competence through these measures is likely to result in increased confidence and positive attitudes towards this essential change (Bingimlas, 2009; Oyaid, 2009).

- ***Teachers' perceptions and attitudes towards ICT***

Another issue that should be considered is that of teachers' perceptions and beliefs towards ICT, which can significantly hamper or, conversely, increase the application of modern technologies in classrooms (Oyaid, 2009). Wasserman and Millgram (2005) argue that the quality of ICT usage is closely connected with teachers' attitudes towards interactive contemporary education. Ertmer (2005) suggests that the decision of how to use ICT in classrooms significantly depends on teachers and their beliefs, confidence and skills in the area of ICT. Furthermore, Demetriadis et al. (2003) note that teachers' negative perceptions towards ICT in schools can present barriers to ICT application, while positive feelings can encourage teachers to learn ICT skills and use them in the teaching process.

Levin and Wadmany (2005) agree that if a teacher is favourably disposed towards ICT, then new technologies and tools are more likely to be accepted and adopted in the classroom.

Commitment to the concept of ICT is clearly one of the key factors in effective ICT implementation (Albirini, 2006), and its acceptance by teachers is essential for the successful integration of electronic tools (Aldraehim and Watson, 2012).

Studies have also suggested that teachers' opinions and beliefs may either motivate or repel them from applying ICT tools in the classroom, so an appropriate level of technical and administrative support is required (Al-harbi, 2014). Tezci (2009) states that ICT only becomes significant when teachers actively use it in classroom practices. Otherwise it does not have any educational value. In order to form positive attitudes towards technology, and encourage teachers to perceive technology as an interesting and enjoyable tool that saves time and effort, appropriate training, aimed at both the technical and the pedagogical skills, is required.

Perceptions remain a contested concept. A growing body of research studies has demonstrated that many teachers are not using ICT effectively in their classrooms (Cuban et al. 2001; Wozney et al. 2006). Many have explored the implications of the "hows" and "whys" behind the teachers' ICT implementation decisions. Murphy (2006) explains that the successful implementation of ICT in education is strongly linked to the understanding of effective pedagogic practices.

Therefore, it was necessary to find a model that describes and explains teachers' knowledge and skills associated with ICT implementation. Technological Pedagogical Content Knowledge (TPACK) is a theoretical framework that provides a way of thinking about successful ICT implementation (Koehler & Mishra, 2009). This model represents the connection and interaction between three domains of knowledge: knowledge of subject matter (content knowledge), knowledge of ICT (technological knowledge), and knowledge of the processes or methods of teaching (pedagogical knowledge). (See figure 2.7).

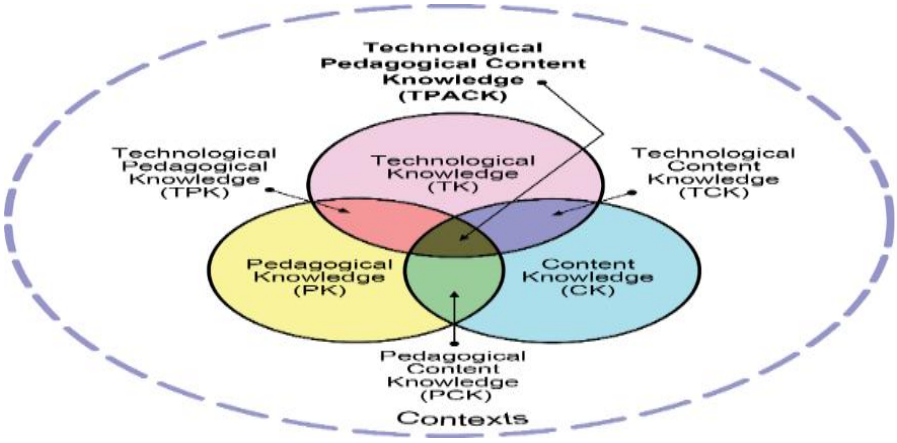


Figure 2.7: TPACK Model, (Koehler &, Mishra 2009)

According to the TPACK framework, in order for teachers to effectively integrate ICT, they must understand how technology, pedagogy, and content can interact with each other to produce effective discipline-based teaching with ICT (Groth et al. 2009).

Therefore, there is a need for further examination of teachers' TPACK knowledge to help develop an understanding of how TPACK could affect teachers' successful implementation of ICT. The technological pedagogical and content knowledge (TPACK) theoretical framework thus provides a way of thinking about successful ICT implementation, specifically the knowledge required to integrate ICT effectively into the classroom.

The TPACK model has been described in many research studies in the literature as a framework utilised to explain and describe teachers' knowledge and skills associated with ICT implementation. It has been emphasised in the literature that the mere existence of ICT in classrooms does not guarantee effective implementation (Mishra and Koehler, 2006).

The lack of teacher knowledge associated with the use of ICT in the educational process has been identified as a major barrier to effective ICT implementation. It is essential that teachers have the knowledge and skills to effectively integrate ICT into their practices. This requires a certain type of knowledge, which has been described in the TPACK theoretical framework (Koehler & Mishra, 2009).

To sum, the application of ICT in education faces many challenges, at the government level as well as the schools, these challenges are related to , for example, ICT infrastructure, Lack of support such as a lack of technical staff and other resources. Challenges related to institutions, such as a lack of leadership supporting and a lack of training in terms of how to incorporate technology into the classroom. Other related to the opposing needs of students and teachers within the classroom (Infante and Nussbaum, 2010).

In addition, Hew and Brush (2007) identified six groups of ICT challenges in education, namely: (1) resources, (2) organisation, (3) culture, (4) beliefs and attitudes, (5) skills and knowledge, and (6) assessment.

In order to contribute to filling the gap in the literature, the discussion of the current situation of ICT implementation in Saudi secondary schools in the following chapter, will take into account the success factors in ICT implementation, in the previous models and theories, which has made a significant contribution to the body of knowledge.

In addition, the study will examine all barriers that identified in the literature review, in the Saudi context. It is worth mentioning that any shortage in these factors can transform them into

barriers. For example, one of the government's roles is the provision of ICT training, which is an important factor, as in the case of a lack of provision of ICT training, this becomes an obstacle which could prevent the application of ICT. The following table summarises these factors, which will be discussed in detail in Chapter III.

Factors	References
Adequate Financial resources	(Al-Sulaimani 2010; Bingimlas, 2009)
Adequate time to use ICT	(Lindfors, 2007)
Adequate ICT training	(Tearle, 2003; Bingimlas, 2009)
Internet access	(Bingimlas, 2009)
Adequate Infrastructure	(Infante and Nussbaum, 2010)
Teachers' negative views and attitudes	(Ertmer, 1999; Hew & Brush, 2007)
Students' negative views and attitudes	(Becta, 2004b)
Adequate Time for training	(Becta, 2004a; Bingimlas, 2009)
Lack awareness of the importance of ICT in education	(Oyied, 2009; Burkhart and Older, 2003)
Appropriate space to use ICT	(Kipsoi et al. 2012)
Appropriate storage space to keep ICT tools	(Kipsoi et al. 2012)
Teachers' skills in ICT	(Al Asmari, 2011)
Scheduling problems	(Tearle, 2003; Jones, 2004)
Adequate Ministry of Education support	(Oyied, 2009; Bingimlas, 2009)
Maintenance	(Infante and Nussbaum, 2010)
Adequate ICT resources (tools)	(Pelgrum, 2001; Bingimlas, 2009; Al-Maini, 2011)
Incentives and motivation	(Infante and Nussbaum, 2010)
Growing number of students	(Cakir and Yildirim, 2013)
Adequate Technical support	(Pelgrum, 2001; Infante and Nussbaum, 2010)
Traditions and beliefs	(Albirini, 2006; Al-Sulaimani 2010)
Clear educational policy	(Oyied,2009)
Religion and culture impact	(Barzilai-Nahon and Barzilai, 2005; Dutta and Coury, 2006)
Collaboration between school staff	(Lindfors, 2007; Bingimlas, 2009)
Confidence in the ability to use ICT	(Pelgrum, 2001; Bingimlas, 2009; Al Asmari, 2011)
Appropriate physical learning environment	(Fisher, 2005)
Resistance to change	(Tearle, 2003)
Misuse of ICT tools	(Yousef & Dahmani, 2008)

Table 2.4: Factors affecting ICT in education

2.7. STUDY CONCEPTUAL FRAMEWORK

Miles and Huberman (1994, p.18) define the conceptual framework as a written or visual product, which "explains, either graphically or in narrative form, the main things to be studied-the key factors, concepts, or variables-and the presumed relationships among them". In this study, the conceptual framework is the system of concepts, expectations, assumptions, beliefs, and theories that support and inform this research (Miles and Huberman, 1994). Therefore, and based on the growing body of studies that have been reviewed in this chapter, which has documented the theories and conditions that could help to identify the factors that affect ICT implementation in education (which are considered to be the most relevant to the study

conceptual framework), all these factors have contributed to develop the study conceptual framework. Although some underlying issues in ICT implementation may be different in each country, the main criteria for ICT implementation do not vary significantly (Touray et al. 2013).

The review of the literature revealed that the successful implementation of ICT in education is strongly linked to understanding the school culture, for instance, the views and attitudes of ICT end-users (Levin and Wadmany, 2005), the level of their satisfaction with the current situation of ICT implementation (Sparks, 1994), as well as the impact of religion and culture on the use of the internet in schools (Albirini 2006; Al-Sulaimani 2010). In addition, the role of the headmaster and the teacher is also a critical factor which confirmed by several studies (Schiller, 2003; Chan, 2004; Blackmore et al. 2011), where their role in ICT application is significant. For instance, the headmaster's role in encouraging teachers and students to use ICT in school and follow-up the application of ICT and supervision, as well as the evaluation of teachers' usage of ICT in their lessons. On the other hand, teachers should employ ICT tools and effective pedagogical practices (Murphy, 2006), with the involvement of the students, develop their skills by attending training programs.

In contrast, the government should play a major role in terms of the development of clear strategies and policies, policies should translate into action, backed the principle of cooperation and participation with various ministries on one hand, and with the schools on the other. Oyaid (2009); Almadhour (2010); Almalki & Williams (2012); Al-Harbi (2014) and Al-Oteawi (2002). Also, the government should play an important role in the preparation and training of qualified teachers (Almohaissin, 2006; AL-Harbi, 2014; Ghamrawi, 2013), providing a suitable infrastructure with the means of safety (Al-Wakeel, 2001). Finally, financial support and the provision of technical tools is a critical factor in by the government to make the ICT implementation more successful (Alzaida, 2008).

Accordingly, the study was able to develop a conceptual framework to be evaluated in the Saudi context, in chapter three. This conceptual framework has two main themes. The first theme is school Level, which has three sub-themes and seven criteria. The second theme is Government Level, which has four sub-themes and 14 criteria. (See table 2.3).

Themes		Sub-themes	Criteria	Research Enquiries	Target
School Level	Internal Factors	**(1) School culture**	❖ Views and attitudes towards ICT integration in education ❖ Religion, culture and beliefs ❖ Satisfaction with current situation	✚ What are the views and attitudes of ICT stakeholders towards ICT implementation in Saudi secondary schools? ✚ To what extent do religion and beliefs play a role in ICT implementation? ✚ What is the level of stakeholder satisfaction with ICT implementation in Saudi secondary schools?	**Headmasters Teachers & Students**
		(2) Headmaster's role & responsibilities in ICT	❖ Creating an attractive school environment (supportive, encouraging, collaborative and facilitative) ❖ Controlling, monitoring and assessing ICT usage	✚ What role the Saudi's headmaster plays in facilitating ICT implementation in Saudi secondary schools? ✚ What ICT applications are used in headmaster functions?	**ALL**
		(3) Teachers' role & responsibilities in ICT	❖ Developing technological and pedagogical skills ❖ Employing ICT in the classroom	✚ To what extent do Saudi teachers employ ICT tools in their lessons? ✚ What is the level of Saudi teacher engagement in ICT training programmes? ✚ To what extent are the teachers qualified to apply ICT in Saudi secondary schools (skills)?	**ALL**
Government Level	External Factors	**(4) Policy and strategy**	❖ Clarifying the education policy ❖ Policies translated into action ❖ Working in partnership ❖ Support and encouragement ❖ Follow-up and supervision ❖ Staff training ❖ Technical support	✚ What are the objectives of the Saudi education policy regarding ICT in education? ✚ To what extent do ICT stakeholders understand the education policy regarding ICT in education? ✚ To what extent is the education policy related to ICT translated into action? ✚ What role does the Saudi government play in facilitating ICT implementation in secondary schools?	**Headmasters Teachers & ICT directors**
		(5) ICT as a subject	❖ Quality of ICT as a subject ❖ ICT tools related to ICT courses and national curriculum	✚ What level of quality does the subject of ICT have? ✚ What is the level of quality of the computers (hardware and software) and their compatibility with what is currently taught in the subject of ICT?	**ALL**
		(6) Resources	❖ Financial resources ❖ ICT resources ❖ Human resources (qualified teachers)	✚ What is the level of availability of ICT: tools, financial and human resources?	**ALL**
		(7) Learning environment	❖ Appropriate physical learning environment (Spaces, safety and security) ❖ ICT facilities and infrastructure	✚ What is the current situation of the school building in regard to facilities, infrastructure, space, safety and security?	**ALL**

Table 2.5: Study Conceptual Framework for ICT implementation in education

2.8. CONCLUSION

Through reviewing the literature related to the history of ICT and its definition, it can be concluded that the historical development of ICT tools has encompassed four revolutions, which have contributed to the final definition of the term of ICT. Therefore, the concept of ICT that is currently used in education refers, in this research, to the diverse set of technological tools and resources (hardware or software) used to communicate, and to create, disseminate, store, and manage information. For example, computers, interactive whiteboards, projectors, mobile phones, recorders, digital, cameras and the internet. Additionally, in this chapter, the link between well-established theories and conceptual frameworks to the current debate has been emphasised.

The significant factors that can be concluded from this review are that the rationale of some of these countries in their promotion of the use of ICT within their education policies is to create development in some areas, such as the school environment, by providing all types of ICT resources and the development of infrastructure, training in ICT, support and encouragement, as well as clear ICT policy, that can be translated into action. Educational theories focusing on the importance of educational leadership and teachers' role in ICT, behaviour, attitudes and perceptions of the ICT users have been clearly identified.

The review of theories related to ICT in education as well as strategies and policy, in some developed and developing countries, has highlighted the study key gap, thereby enabling the study to detect the limitations and previously excluded debates within the reviewed literature and thus to identify several factors that should be taken into account when applying ICT in education. This provides a useful recognition of the issues facing ICT application in Saudi schools and can thus reveal the factors hindering implementation.

Accordingly, the study concluded with two core categories (factors) that affect ICT implementation in education (internal and external). Each main factor has several sub-factors and several criteria, which helped the study to build the conceptual framework of this study. (See section 2.6.). By doing so, this chapter was able to achieve the first and second study objectives (see Chapter I). The next chapter of the literature review strives to achieve the third objective, which is aimed at exploring the current situation of ICT implementation in Saudi Arabia, guided by the criteria that have been defined in this chapter (study conceptual framework).

CHAPTER III

ICT IN SAUDI ARABIA: A CASE STUDY

3. INTRODUCTION

This chapter focuses on the relevant literature on ICT implementation in Saudi secondary schools (as a case study of this research). It begins by giving an overview of Saudi Arabia, followed by the Saudi educational system, the history of ICT in Saudi Arabia and educational policy. The main aim of this chapter is to identify the challenges relating to ICT tools in Saudi secondary schools, guided by criteria that are defined in the study's conceptual framework in chapter two, in order to identify the factors that hinder or help the application of ICT tools in Saudi secondary schools.

3.1. SAUDI ARABIA BACKGROUND

Saudi Arabia is one of the most youthful countries in the world, where young Saudis make up 60% of the population (30,770,375) and under-25s represent 50% of the population (Central Department of Statistics, 2016; Nureldine, 2015). The official language is Arabic and the official religion is Islam. All legislation and laws are derived from the Holy Qur'an and Sunnah. Therefore, as Islam puts a particular emphasis on education, it is one of the most important aspects of Saudi social life (Oyaid, 2009).

Social structure is also an essential aspect of Saudi culture, with most people coming from large tribes and families and expecting to stay in close proximity to their relatives, including sharing a house with them or living nearby. The value of building strong social relationships is heavily emphasised in Saudi culture, with many employers practicing nepotism, choosing to recruit family or close friends who they know they can trust (Alkahtani et al. 2013).

What distinguishes the Saudi culture is the attachment to customs and traditions that are difficult to change; even if they are wrong. For example, some people do not disclose the names of females in their family, as it is not within the norms of some tribes. In addition, the government does not allow females to travel alone, without permission from their guardians (Alhussein, 2014). In addition, gender segregation is another characteristic feature of Saudi Arabian culture, especially in education (Baki, 2004).

However, since 1960 when the Saudi Government introduced a national education programme for girls, women have enjoyed more opportunities for both education and employment (Al-Bakr, 1990). The first government school for girls was built in 1964 and by the end of the

1990s, girls' schools had been established in every city and town of the Kingdom (SUSRIS, 2014).

Understanding of the cultural and social context of the community is vital as it shapes acceptance of new innovations as well as what is considered new to a specific culture. Technology does not only shape culture, but can only be accepted if it has a purpose within the social and cultural context to which it is introduced (Frahini, 1996). Some studies (Erumban and Dejong, 2006) have reported that the national culture and the rate at which the country adopts ICT are highly correlated. Therefore, an understanding of the social and cultural aspect of Saudi society helps the study to better understand attitudes towards and acceptability of ICT in schools.

3.2. THE SAUDI EDUCATIONAL SYSTEM

In 1953, King Saud established the Ministry of Education, which was responsible for all levels of boys' general education: primary, intermediate, secondary and vocational education. Moreover, it was responsible for adult education, as it had created a plan for the eradication of illiteracy and the provision of professional training (Oyaid, 2009). It also sets educational standards in various colleges and post-secondary technical and private schools.

Its responsibilities have included to direct and provide resources, curricula and future plans to all public schools as well as supervision for more than 34,000 schools, more than 650,000 teachers and over 50,000 administrative staff in 42 different districts, with the main goal being to advance the quality of education throughout the country (Ministry of Education, 2016).

Education in Saudi Arabia is not compulsory, but it is free for all, with the provision of necessary textbooks and health services for all students (Groiss, 2003). In addition, the administration of the education system in Saudi Arabia is highly centralised. All educational policies are subject to government control and supervision by the Supreme Council of Education. Curricula and textbooks are uniform throughout the Kingdom (Alzaida, 2008). This is crucial as reviewing any existing ICT policies involves key stakeholders and this needs to be factored into the implementation framework.

General education in Saudi Arabia consists of four phases: pre-school, six-grade primary school, three-grade intermediate school and three-grade secondary (high) school (Ministry of Education, 2013). The secondary education stage is slightly different for boys and girls (Alshmrany, 2012). During the first year, students study general subjects, while in the second and the third year, they choose an area in which they want to advance (Oyaid, 2009). Islamic

and Arabic studies and Natural Sciences are the only two specializations available for girls, but boys can also choose Management, Social Sciences and Technological Sciences. The following table shows the number of schools and students in Saudi Arabia.

Table 3.1: The number of Saudi schools and students (Ministry of Education, 2016)

School level	**Age**	Number of schools		Number of students		Length of study
		Male	**Female**	**Male**	**Female**	
Pre-school	3-5	0	2.779	0	226.977	2 Years
Primary Schools	6-12	6.892	6.940	1.328.418	1.295.247	6 Years
Intermediate Schools	12-15	4.421	4.007	644.029	605.362	3 Years
Secondary school	15-18	3.072	2.898	680.134	578.454	3 Years
Special Needs Schools	6-19	1.427	663	16.625	10.317	
Literacy Schools	+ 18	856	1.442	17.623	38.297	
Total	-------	16.668	1.8729	2.686829	2.754.651	
Total		**35.397**	**37.458**	**5.441.480**		

However, the culture of Saudi schools is different from those in western countries (Al-Showaye, 2002). This relates to the impact of religion customs and traditions, which will be discussed in sections 3.5.

3.3. HISTORY OF ICT IN SAUDI ARABIA

The history of introducing ICT into the Saudi education system has gone through different stages. The initial introduction in 1985 was only as the subject of ICT. The initial experiment for this project was introduced by the Ministry of Education at a few private Saudi secondary schools and was implemented through three concepts: an introduction to computer sciences, BASIC programming with system programming and, thirdly, information systems (Oyaid, 2009).

The success of the project encouraged the Ministry of Education in 1991 to introduce ICT subject as a part of the curriculum in all boys' secondary schools and, after a while, it was also available in girls' schools. This project was successful and, consequently, in 1996 computer studies became available to all Saudi secondary schools (Alshmrany, 2012). The internet was first brought to Saudi Arabia in 1994, in some state institutions for medical, academic and research purposes (CITC.SA, 2011).

In 1997, the Saudi Ministers' council gave the KACST (King Abdul-Aziz City for Science and Technology) all authority to monitor and control internet use in Saudi Arabia. In 1999, the public right of use was eventually authorised and by the end of 2000, there were about 200,000 internet users in Saudi Arabia (CITC.SA, 2011). By the end of the second quarter of 2015, the

number of Internet users in Saudi Arabia had exceeded 18 million, with total internet access of about 66% (Internet World State, 2015) (See Table 3.2).

Table 3.2: Middle East Internet Users (Internet World State, 2015)

MIDDLE EAST	Population (2015 Est.)	Users, in Dec/2000	Internet Usage 30-Nov-2015	% Population (Penetration)	Internet % users	Facebook 15-Nov-2015
Bahrain	1,346,613	40,000	1,297,500	96.4%	1.1%	700,000
Iran	81,824,270	250,000	46,800,000	57.2%	38.0%	n/a
Iraq	33,309,836	12,500	11,000,000	33.0%	8.9%	11,000,000
Israel	7,935,149	1,270,00	5,928,772	74.7%	4.8%	4,400,000
Jordan	6,623,279	127,300	5,700,000	86.1%	4.6%	4,100,000
Kuwait	3,996,899	150,000	3,145,559	78.7%	2.6%	1,900,000
Lebanon	4,151,234	300,000	3,336,517	80.4%	2.7%	2,600,000
Oman	3,286,936	90,000	2,584,316	78.6%	2.1%	1,200,000
Palestine (W.B)	2,785,366	35,000	1,800,000	64.6%	1.5%	1,800,000
Qatar	2,194,817	30,000	2,016,400	91.9%	1.6%	1,700,000
Saudi Arabia	**27,752,316**	**200,000**	**18,300,000**	**65.9%**	**14.9%**	**12,000,000**
Syria	22,878,524	30,000	6,426,577	28.1%	5.2%	n/a
U.A.E	9,445,624	735,000	8,807,226	93.2%	7.2%	6,300,000
Yemen	26,737,317	15,000	6,029,265	22.6%	4.9%	1,700,000
Gaza Strip	1,869,055	n/a	see Palestine	n/a	n/a	see Palestine
Total	236,137,235	3,284,800	123,172,132	52.2%	100.0%	49,400,000

Recent statistics on Internet access in Saudi Arabia are available from The ICT Development Index (IDI) (2015), which is a composite index that combines 11 indicators into one benchmark measure that can be used to monitor and compare developments in information and communication technology (ICT) between countries and over time. It showed that Saudi Arabia improved its IDI value from 4.96 in IDI 2010 to 7.42 in IDI 2015, raising its global ranking over the same period from 56th to 41st. As in most countries, it saw the greatest improvement in sub-index use. However, the indicator reflecting the highest growth was the percentage of households with internet access, which rose from below 55 per cent in 2010 to over 90 per cent in 2015.

This indicator shows the rapid development of ICT in Saudi Arabia and explains to what extent Saudi people are modern and fond of using technology (Fatani, 2009). The reported use of internet is in the general population, but not specific to schools. The current study will review the application of ICT tools in schools including the use of the internet. Understanding of the history of ICT in Saudi Arabia helps the study to get insights into evolution of ICT in the country as well as the various factors that have helped or hindered its implementation in schools. The process also helps in understanding the government's commitment to implementing ICT and helps the study to understand gaps and therefore propose solutions.

3.4. ICT AND SAUDI CULTURE

Although Saudi Arabia is easily the largest ICT market in the Middle East in regard to capital value and its level of spending, with more than 18 million consumers and numerous global companies and its telecommunications and information technology industries representing over 55% and 51% of the Middle East markets respectively, it still remains significantly underdeveloped in using the internet in education when compared to some countries (BuddeComm, 2015; Internet World State, 2015).

Jin (2010) attributed this to the impact of Islamic precepts and culture. One of the main features of Saudi society is the dichotomy between preservation of beliefs and religious values and the impact of modern technology. Some authorities in the country believe that numerous antisocial behaviours are associated with adopting the internet. This makes them more reluctant to adopt ICT in their education system. As a result, Saudi Arabian internet censorship levels are considered among the most extensive in the world. For example, a year and a half after the introduction of the internet in the Kingdom of Saudi Arabia, back in 1999, the number of websites that had been banned in the country reached 200,000. Five years later, the number of banned websites had doubled to 400,000 (Albugami and Ahmed, 2015d).

In 2012 and early 2013 the Saudi authorities continued to employ strict filtering over internet content. Sites that are judged to contain anti-Islamic, illegal, harmful, or offensive material are routinely banned, including pages related to drugs, gambling and pornography. Part of the government's blocking policy is designed to disrupt terrorist networks and the dissemination of extremist ideology (Al-Arabiya, 2012).

The extensive list of sites blocked under these policies is supplemented by an additional list formulated from recommendations of the public (CITC.SA, 2011). This in turn has affected the implementation of e-learning in Saudi educational institutions, which is still at an early development stage due to many challenges still facing the country, including the aforementioned culture and religion (Oyaid, 2009).

Thus, understanding of religion and beliefs as a factor affecting ICT implementation, especially at school level, is in line with this research, as outlined in the conceptual framework. Therefore, this study takes into account the impact of religion, culture and beliefs on ICT users in Saudi secondary schools.

3.5. FACTORS AFFECTING ICT IMPLEMENTATION IN SAUDI SCHOOLS

This section aims to examine the current ICT implementation in Saudi secondary schools (School Level) by reviewing the related literature, in order to identify the factors that prevent or help the application of ICT tools in Saudi secondary schools. The review of the literature will be guided by criteria defined in the study's conceptual framework in chapter II, section 2.6 and will be presented in sequential order, according to the table below.

Table 3.3: Internal Challenges (School Level)

Themes		Sub-themes	Criteria
School Level	Internal Factors	**(1) School culture**	❖ **Views and attitudes towards ICT integration in education** ❖ **Culture and beliefs** ❖ **Satisfaction with current situation**
		(2) Headmaster's role & responsibilities in ICT	❖ **Creating an attractive school environment** (Supporter, encourager, collaborator and facilitator) ❖ **Controlling, monitoring and assessing ICT usage**
		(3) Teachers' role & responsibilities in ICT	❖ **Developing technological and pedagogical skills** ❖ **Employing ICT in the classroom**

The remainder of this section will discuss the internal ICT factors.

3.5.1. INTERNAL FACTORS (School Level)

1. School Culture

a) View and attitudes towards ICT integration in education

Chan (2004) stated, school culture should be considered in adopting new technologies and teaching practices needed for the ICT implementation. This includes staff views and attitudes. Several studies have shown that one of the key factors in effective ICT implementation is teachers' commitment to the idea (Albirini, 2006) and teachers' views and attitudes may either motivate or repel them from applying ICT tools in the classrooms (Al-Harbi, 2014; Alshumaimeri, 2008; Saleh, 2008; Demetriadis et al. 2003).

In the same context, studies carried out by Levin & Wadmany (2005) established that if the school's staff's attitudes are constructive concerning ICT implementation, it is likely that ICT will be accepted and applied in schools. Therefore, personal attitudes play a crucial role in the integration of ICT in the classroom (Hew & Brush, 2007; Tezci, 2009) and the quality of ICT

usage is closely connected with teachers' attitudes towards interactive contemporary education (Wasserman and Millgram, 2005; Ertmer, 2005).

In the Saudi context, a study conducted by Al-Showaye (2002) examined Saudi teachers' views and attitudes regarding ICT in education and showed that competent teachers with quality training considered traditional methods of teaching to be less beneficial for modern students and that new tools were of more benefit and added more enjoyment to lessons.

A similar study by Alamry (2013) found that most Saudi teachers have positive views and attitudes towards using ICT tools in their classroom. In addition, they felt confident in using computers. However, the study concludes that the Ministry of Education needs to provide the teachers with training to ensure that the new technologies are successfully implemented in the classroom.

Likewise, Aytekin et al. (2012) have examined Saudi secondary school teachers' attitudes towards using interactive whiteboards in the classroom. Their results indicated that there was a positive attitude among Saudi teachers towards using such technology in the classroom. However, only a few teachers indicated that they use interactive whiteboards effectively in their classrooms. The study concluded that the teachers need a professional development program for effective use of such technology to help them in improving their skills.

It can be concluded, that there is a direct correlation between views and attitudes and acceptance of the use of ICT tools in education (Zhang and Dragana, 2008). According to Akbaba and Kurubacak (1999) and Huang & Liaw (2005), attitudes toward ICT influence teachers' acceptance of the usefulness of technology and also influence whether teachers implement ICT in their classrooms. Hence, if the teachers' views and attitudes are positive toward the use of ICT then they can easily provide useful insight regarding the integration of ICT into teaching and learning processes (Lindfors, 2007). This corresponds to what has been suggested in the theory of acceptance technology (Ajzen & Fishbein, 1975).

This study adds insights into teacher's views and attitudes towards ICT integration in education and traditional teaching methods. Understanding of these aspects goes beyond application of ICT tools and looks at ICT's role in modern teaching. The study thus extends work by Aytekin et al. (2012) that only looked at the use of interactive whiteboards and Alamry (2013) that investigated attitudes and views regarding ICT.

b) Culture and beliefs

A growing number of studies (Thomas et al. 2005; Zhao and Frank, 2003; Hennessy et al. 2005) have examined the relationship between the national culture and acceptance of technology. These studies have emphasized the impact and role of culture and beliefs to the integration of ICT. In this context, Almalki and Williams (2012) stated that cultural differences directly or indirectly affect the degree of ICT integration into the learning environment

Within the school, research studies have shown that key factors that influence the implementation of ICT in the educational system include religion, culture and beliefs (Albirini 2006; Al-Sulaimani, 2010; Oyaid, 2009). In Saudi Arabia, religion and traditions permeate all aspects of life, including teaching, as all educational matters must meet the strict requirements of Shari'a laws (Al-Sulaimani, 2010). According to Hennessey et al. (2005, p. 161), "Teachers are reluctant to adopt a technology that seems incompatible with the norms of a subject culture." In most cases, developing countries copy-paste educational technology frameworks from developed countries. Most of these initiatives end up failing due to differences in culture (Almalki and Williams, 2012). Therefore, it's not surprising that Saudi culture and social restraints can slow down the development of the internet in Saudi schools (Almalki and Williams, 2012; Oyaid, 2009).

In fact, as explained by Alenezi (2015), balancing technology with Islamic values has been a challenging endeavor for the Saudi education sector. Hence, there is a necessity to consider the underlying cultural framework when implementing ICT initiatives in the teaching and learning environment in order for Islamic beliefs not to be in conflict with digital technologies. This could explain the limitations of the internet, in Saudi schools, which may be due to religious beliefs (Barzilai-Nahon, 2005). To further this debate, this study therefore reviews the element of religious beliefs in the application of ICT.

Accordingly, the religion and culture are considered as factors that have been identified as reasons behind the control and limiting of access to the internet in Saudi Arabia (Al-Amr, 1998). Saqlain et al. (2013) explained that the easy availability of pictures of women and discussion of taboo subjects such as dating and sexuality have led the majority of Saudis to believe that the internet contradicts with Saudi religious and cultural morality.

A study conducted in Saudi secondary schools by Oyaid (2009) has found some teachers viewed ICT as a threat to their religion and culture. Oyaid said they worried that the use of ICT in schools could impact on teachers' and students' religion and culture. She commented on this

issue by saying, *'In my view, they were afraid of globalization.'* The question is then: how can Saudi Secondary schools benefit from the wide knowledge and learning provided via the internet while preserving their religion and culture? For the purpose of this study, the influence of religion is therefore crucial in ICT implementation.

However, Al-Saggaf and Williamson (2004) have a different point of view. They think that allowing modern creations into the school does not mean cultural westernization. The employment of new information and communication technology simply signifies what is being used by the whole world and therefore the nation may remain astride of global innovations.

c) Satisfaction with the current situation

For the successful application of ICT tools, examining the satisfaction level among school staff with the current situation is critical (Goyal et al. 2010). For example, Sparks (1994) confirms that dissatisfaction with the current situation is a strong reason to neglect the use of ICT in classrooms. Therefore, to make ICT implementation more successful, school staff should start with the identification of educational problems and factors behind them. Hence, the implementation of ICT should start from *"dissatisfaction with the educational opportunities offered to [students] and striving to do better"* (Newhouse, 2002b, p. 5).

As mentioned earlier, the Saudi government has invested heavily in the ICT sector, especially in schools, either as a tool or as an essential subject (Almohaissin, 2006). However, many studies have indicated that the educators in Saudi Arabia are not satisfied with the current situation (introduction of ICT in schools) (Al-Alwani and Soomro, 2010; Alsaeed, 2006) and it needs further efforts to keep up with developed countries (Alhamd et al. 2004). For instance, in a study of issues concerning ICT implementation in Saudi secondary schools, Alzaida (2008) stated that there was dissatisfaction with the current situation, including the lack of financial and ICT resources, infrastructure and lack of financial reward.

Al-Sulaimani (2010) concluded in his study about the integration of ICT tools in Saudi schools, that there was clearly dissatisfaction with schools' technical support for ICT, with 85% reporting that inadequate support impeded their ability to use ICT. Furthermore, the issue of maintenance had deteriorated to the extent that computer repairs for boys' schools now involved depositing a computer at a central facility to reduce travel time for technicians. However, the service was proving inadequate for the huge number of schools it was expected to serve.

Saudi Arabia's extremely conservative approach to teaching hinders the implementation of ICT plans in schools. However, integrating technology into teaching and learning certainly implies changes in the educational setting. Therefore, teachers' resistance to undergoing changes is another factor significantly hampering the successful implementation of ICT in classrooms (Bingimlas, 2009). It is therefore obvious that the change will elicit different reactions from different teachers. As explained by Bingimlas (2009), resistance to change may not be a barrier in itself; it may be a sign that something is not right. Teachers could be dissatisfied about inadequate technical support, their limited technical expertise, as well as the time needed for planning.

In this study satisfaction is not limited to the opportunities ICT would offer. The focus is on both internal and external factors that makes the current situation call for improvement. The study, therefore, looks at how teachers' satisfaction level could hinder ICT implementation.

A study conducted by Almaghlouth (2008) to investigate the perceptions of Saudi science teachers towards the use of ICT in instructional practices found that even though some respondents perceived educational technology to be of immense value, they would be reluctant to use the resources if there was no adequate support. This raises the importance of considering the opinions of teachers towards the change; otherwise, teachers may continue holding on to their conventional instructional practices.

It is apparent that the integration of ICT in education is a highly comprehensive process requiring changes at all system levels in school and outside school. Teachers, as the providers of information and knowledge, should adjust to the new strategy to make their contribution to the learning process relevant. In this matter, Scrimshaw (2004) gave several possible explanations for teachers' opposition to ICT usage. According to this author, insufficient computer skills may result in the lack of self-confidence, which subsequently prevents teachers from using new technologies. Moreover, ICT tools may be incompatible with teachers' educational beliefs, which is especially widespread in traditional Saudi Arabian schools. Thus, taking into account the crucial role of teachers, administration of schools need to pay closer attention to their attitudes and beliefs so that they do not hinder the implementation of ICT technologies in the educational process (Oyaid 2009). Furthermore, all these factors can help to raise the level of school staff satisfaction or could be reasons for dissatisfaction (Bingimlas, 2009).

Although, that most studies confirmed that the Saudi teachers have a positive views towards ICT integration in education. However, there are some factors preventing them from using these tools effectively. Culture, beliefs and satisfaction about the current situation, may all be linked with other factors such as lack of understanding about how the technology will be beneficial to the teacher (pedagogy training) and uncertainty about management support (headmaster's role) and guidance (policy and strategies), as well as the lack of training (Bingimlas, 2009), which will be discussed later.

In conclusion, school culture (staff's views and attitudes, culture and religion, as well as satisfaction with the current ICT situation), are factors affecting ICT implementation in Saudi secondary schools.

2. Headmaster's role and responsibilities towards ICT

- ***Creator for an attractive learning environment***

Headmasters play a crucial and versatile role in leading positive and productive instructions for schools, resulting in a favourable workplace for teachers and effervescent learning environments for students. Successful school leaders affect student achievement by means of two essential pathways. These include supporting and developing effective teachers and implementing useful organizational processes. Headmasters should act as educational visionaries, instructional and curriculum leaders and assessment experts. Secondly, they are also expected to be disciplinarians, community builders and public relations experts, as well as budget analysts, facility managers and special programs administrators. Moreover, they are the guardians of various legal, contractual and policy mandates and initiatives (Schiller, 2003).

According to Al-harbi (2003), in the middle of such commotion, new systems of superior durability have become apparent with the competence to adapt to the imperative changes. In order to persevere through global developments, calls for educational restructuring and the introduction of content-related restoration have been continual, at the educational administration level and inside the schools themselves. The school headmaster, playing a strategic role in the educational process, is assigned with a decisive burden, being in command of the diverse aspects taking place inside and outside of the school.

Bestowed with the executive responsibilities involved with the school headmastership, such as decision making, communication, motivation and performance appraisal, it is apparent that the mastermind of such undertakings is the school headmaster who is at the pinnacle of the administrative hierarchy.

Moral purpose is required from headmasters, especially in terms of formulating and achieving goals. They should work to achieve an improved life and thinking of the final outcome is vital in this process, as well as the means by which it is attained. The view of the purpose of education is clear; that is to produce students who would be continual learners. To achieve this is a critical issue since technology has altered the way life operates in the same way that it is changing the manner in which headmasters must handle their moral purpose. Of course, moral purpose is, or should be, a natural tendency, but unless it is cultivated and adapted to daily operations, it will not flourish (Yuen et al. 2003).

Bingimlas (2009) stresses that the role of the headmaster in ICT implementation is very important. He says teachers who are supported and encouraged by the headmaster apply ICT in their lessons more in comparison with those who do not get support or encouragement from the headmaster. Furthermore, the headmaster should ensure that students have as much access to technology as their teachers so that the flow of learning and communication will be developed (Schiller, 2003).

Studying the role of school leaders in the utilisation of ICT in Saudi Arabian secondary schools, Albugami and Ahmed (2015b) found various levels of encouragement and support given to class teachers for use of ICT. About 54% of headmasters often encouraged and supported the schoolteachers in using ICT in their classrooms, with 22% only doing it sometimes.

Arnolds (2006) found out that Saudi Arabian teachers are inflexible to innovative ideas and prefer to stick to established rules and traditions in teaching. Interestingly, most teachers in Saudi Arabia are unhappy with their lesson and weekly plans, curriculum and administration, but they rarely deviate from their prescribed roles (Al-Sulaimani, 2010). No doubt, these conservative attitudes may prevent teachers from using ICT in classrooms if they are not encouraged and stimulated to do so.

It has been mentioned earlier, in chapter two, that the concept of leadership is crucial for the successful integration of any organizational change. The case of ICT implementation in education is not an exception. Leadership, either formal or informal, is a critical component for the adoption of ICT tools throughout the education process in a variety of subjects (Blackmore et al. 2011).

Additionally, an overview of literature revealed that the key school-level barriers to ICT-based education are lack of resources, poor access to ICT tools, lack of teacher training and the like. Thus, it is the role of a school headmaster to create facilitating conditions, such as to provide

an ICT infrastructure, find and allocate resources and to determine processes and discourses. While teachers have an impact on students' attitudes towards and use of ICT tools in classroom activities, school headmasters encourage teachers to exercise ICT practices through creating an appealing learning environment (Blackmore et al. 2011).

Interestingly, there were few studies that examined Saudi headmasters' role regarding ICT, which in turn confirms the significance of this study. However, some studies showed that most Saudi headmasters are not qualified in using ICT tools in their duties. For instance, Albugami (2008) investigated the role of the Saudi headmaster, as a facilitator or hindrance to ICT implementation in Saudi schools. He concluded that 81.8% of headmasters are not a specialist in any area of ICT. Regarding attendance to any training course on ICT within the past three years, only 25% of them affirmed, while 75% negated the statement.

Another role of the headmaster in facilitating ICT is to provide teachers with more free time for preparation (Al Mulhim, 2014; Jones, 2004; Tearle, 2003). Time limitations and difficulties of scheduling adequate time for technology-oriented classes is actually a significant barrier to the use of technological resources in teaching. This issue does not leave Saudi teachers enough time to apply ICT tools in classroom activities (Al-Alwani, 2005).

In Saudi Arabia, the average teacher's schedule involves 18-24 lessons per week (working from 7.00 in the morning until 2.00 p.m.), with each lesson lasting 45 minutes, leaving a very limited amount of time to work on integrating technology into their instructional practices (Al Asmari, 2011; Al-Alwani, 2005; Sicilia, 2005). This was confirmed by Al-Mulhim (2014). In his results, most of the respondents in multiple interviews and studies reported that they needed more time to consult internet resources, prepare materials, or attend training (2014). Al-Alwani (2005) found that an overloaded schedule does not leave teachers enough time to apply audio-visual equipment in classroom activities. Thus, Al-Mulhim (2014) concluded that administration of schools needs to encourage teachers to use ICT tools in the educational process by providing them with more free time for preparation.

Based on the evidence presented above, one may realise that the role of a school headmaster in ICT implementation is extremely important, since it impacts upon teachers' use of ICT tools in their classrooms. In the scope of functions imposed on a school headmaster, the key one is to establish collaboration and understanding with another important stakeholder in ICT implementation (Mulkeen, 2003; Schiller, 2003).

The foregoing are clearly compatible with the study framework, which suggested that the headmaster's roles should be supportive, encouraging, collaborative and facilitative of ICT implementation in school. The literature also indicates the importance of the headmaster's skills in ICT. All these factors will be investigated, in more detail, in chapters 5 and 6.

3. Teachers' role and responsibilities towards ICT

a) Developing pedagogical and technological skills

It has been clarified earlier, in chapter two, that the teachers are the key source of change and modernisation in the education system, since they are the drivers of ICT promotion. In addition, their roles and practices in using ICT tools in classroom activities is crucial, as its success depends on every individual teacher's skills, desire and competence (Thokchom, 2013).

However, Saudi teachers frequently explain their reluctance to use ICT tools in classrooms because they believe that their skills are poorer than those of their students. Teachers' anxiety about their potential failure evokes their denial of the usefulness and effectiveness of ICT in education. In contrast, teachers' confidence in using technology supports their belief in technology's contribution to teaching and individual development and the necessity to expand the application of ICT in the future (Bingimla, 2009). Hence, pedagogical and technological skills have always been considered as an important requirement for teachers to achieve successful ICT usage in the teaching process (Al-harbi 2014).

The lack of teachers' ICT skills, in general, is actually the most commonly cited barrier in the successful implementation of ICT in teaching and learning (Bingimlas, 2009; Balanskat et al. 2006; Hakami et al. 2013; Buabeng-Andoh, 2012). This case is the same in Saudi Arabia, since the research evidence shows that Saudi teachers lack the basic skills for using ICT in classrooms, which greatly influences the implementation of ICT technologies in schools (Al-Mulhim 2013; Al-harbi, 2014). Al-Oteawi (2002) presented research results showing that 98% of teachers in Saudi Arabia feel the urgent need to improve their ICT skills and knowledge.

Al-harbi (2014) believes that the failure of Saudi teachers to carry out their roles regarding ICT in the classroom relates to the shortcomings in the government's role. He sees that the Saudi government does not provide teachers with the necessary knowledge and skills to deliver information in a modern manner. As a result of insufficient training in digital literacy, teachers are less likely to use ICT tools as they are not confident in their skills.

Though ICT training is necessary, it is important for educators to be competent in other areas such as technology, pedagogy and content (Koehler and Mishra, 2009). Bingimlas (2009) also

support this view and argues that rather than just ICT training, pedagogical training should also be provided to teachers. He adds that even after receiving ICT training, educators still face the challenge of incorporating the knowledge acquired. For effective utilization of ICT in the teaching and learning process, teachers must have comprehensive knowledge in technology, pedagogy and content.

Aldhahi (2011) noted that training programs in Saudi Arabia do not meet all quality standards and do not address all teachers' needs. Hence, all educators agree that the first step the government should take in order to ensure long-term ICT implementation is to provide teachers with quality training (Tearle, 2003; Bingimlas, 2009; Al-harbi, 2014).

Cheong & Kim (2009) believe that technical knowledge is not enough and that communication, motivation, reinforcement, questioning and classroom management are also extremely important for the formation of a positive attitude regarding ICT tools. Thus, educators should realize that addressing the problem of insufficient skills and training could help to motivate teachers to use ICT as much as possible.

According to Koehler and Mishra (2009), these elements interact to provide an understanding of delivering content using the most appropriate pedagogy and technology. Knowledge of these aspects places teachers in a better position to use ICT in specific activities to improve student learning. In essence, teachers knowledgeable in these aspects are better placed to use ICT effectively as opposed to those with ICT training only. The implication is that teachers should receive not only ICT training, but also pedagogical training. For instance, in Saudi Arabia, teachers' poor preparation on how to select and use ICT tools in teaching is regarded as a key constraint to implementing technologies in science education (Bingimlas, 2009).

Therefore, teachers should be encouraged and motivated to take courses in computer use. Such training should provide guidance in choosing and applying ICT tools throughout the pedagogic process. Thus, it is essential to create an ICT capability among teachers to make ICT tools an integral part of the educational process and assist them with building the ICT capability of learners (Bingimlas, 2009; Kaino, 2008). Furthermore, the educational system needs to modify programs of teachers' education and training to create qualified teachers. Hence, the issue of teachers' competence in computer use is crucial; proper competence is likely to provoke confidence and positive attitudes towards change.

Oyaid (2009) explained that inadequate ICT skills create anxiety in teachers and prevent them from applying technology. This author also presented research results showing that some

teachers may feel overwhelmed by the fast development of ICT and that they fear students may be more confident in ICT use than they are.

To conclude, the success of the development of teachers' technological and educational skills, are down in the first place to teachers' desire and their self-motivation. Hence, the role of the teachers in the ICT application starts from their desire to develop their skills, which helps to raise their awareness about the importance of ICT in education (Burkhart and Older, 2003; Bingimla, 2009).

b) Employing ICT in classrooms

Another important factor about teachers' roles regarding ICT is to employ it in their classrooms. Tezci (2009) stated that ICT only becomes significant when teachers actively use it in classroom practices, otherwise it does not have any educational value. Hence, to form positive student attitudes towards technology and make them perceive technology as an interesting and enjoyable tool that saves time and effort, teachers are required to employ ICT in their lessons and engage students in using ICT.

In Saudi schools, studies revealed that there are variations in the employment of ICT by teachers in schools. This is due to factors such as the schools' condition. For example, Alenezi (2015) investigates the *'Influences of the mandated presence of ICT in Saudi Arabian Secondary Schools'*. He stated that the obligatory uses of ICT tools in education had increased the presence of ICT in the Saudi secondary school.

However, it seems that Saudi teachers are not applying these tools in their classrooms for reasons such as: they feel there is no coordination and collaboration in a school setting concerning ICT implementation as well as no administrative support; and even if this support is available, it is not sufficient. Furthermore, they are rarely rewarded for their initiatives (related to ICT). Finally, there is no well-defined conception of a teacher that is capable of integrating ICT into a subject domain.

Almaghlouth (2008) examined the role of Saudi teachers in secondary schools regarding ICT, with questions like, "which of the following tools do you use in your school?" and, "how often do you use these tools?" Almaghlouth found the projector device came out as the most used tool (56%) and only 2% of the teachers that were interviewed use the internet in school.

The study also noted that students and teachers are limited in terms of access to the internet and computer labs by school administration.

Albugami and Ahmed (2015c) found that a significant percentage of the ICT tools were brought by teachers and some of the devices had broken-down. The researchers also noted that most of the secondary school administrators did not have enough resources to fix the broken devices. Similarly, it emerged that some of the schools were not connected to the internet. These factors could explain the failure of implementation of ICT in most Saudi secondary schools.

However, Al Asmari (2011) stated that the teachers suffer from lack of time because of too much material that needs to be explained in insufficient time. Also, teachers need to be equipped with sufficient training. That will enable them to implement ICT in classrooms properly. This is worsened by the lack of motivation and encouragement from the administration.

Teachers' reluctance to use ICT tools in classroom activities is explained by a variety of obstacles, including their competence, school digital infrastructure and access to ICT tools. Hence, teachers lacking ICT skills are enthusiastic about using computers in their teaching practices and integrating supplementary learning, which creates a vicious cycle precluding full-scale ICT integration in education (Bingimlas, 2009).

Lindfors (2007) highlighted in his model that the teacher's role in attaining this depends on their confidence in using ICT. He pointed out that pedagogical use of ICT has three main concerns: availability of information and knowledge, the independency of time and place and collaboration opportunities to work under different conditions. This study employ this principle to investigate these factors and to what extent they can be used to form the study framework by reviewing teachers' views concerning the value of using ICT in teaching, the ICT teachers' competencies, the pedagogical challenges of using ICT in teaching and the future of ICT in pedagogical use. The following section discuss the ICT external factors.

3.5.2 EXTERNAL FACTORS (Government Level)

This section aims to review the literature related to the Saudi government's role (Ministry of Education) regarding ICT implementation in schools, as an external factor. The review of literature will be presented in sequential order according to the table below.

Government Level	External Challenges	**(4) Policy and strategy**	❖ Clarifying the education policy ❖ Policies translated into action ❖ Working in partnership ❖ Government support and encouragement ❖ Follow-up and supervision ❖ Staff training ❖ Technical support
		(5) ICT as a subject	❖ Quality of ICT as a subject ❖ ICT tools related to ICT courses and national curriculum
		(6) Resources	❖ Financial resources ❖ ICT resources ❖ Human resources (qualified teachers)
		(7) Learning environment	❖ Appropriate physical learning environment (Spaces, safety and security) ❖ ICT facilities and infrastructure

Table 3.4: External factor (Government Level)

4- policy and strategies

a) Clarifying the education policy

The education policy is the government's plans and strategies which explain the general principles of government, based on the state's objectives regarding the educational process, whether these articles are written and published in the form of decrees, or unwritten and unpublished, or are actions on the ground. Supervisors and managers of educational institutions should be aware of this policy (OECD, 2015). As Saudi Arabia wants to become a competitive country with a developed economy, it needs to address the most pressing problems of contemporary society, in particular, educational ones (Al-Wakeel, 2001). As the contemporary world cannot function without technology and information, Oyaid (2009) emphasises that the Saudi Arabian government should realize that there is a strong necessity to apply ICT tools in education through a clear education policy.

Paragraph fourteen in the Saudi education policy illustrated the necessity of harmonious consistency between the knowledge and methodology applied (using technology) as the most significant means of cultural, social, economic and health development, to raise the level of the nation, in order to allow people to do their part in the world's cultural progress (Ministry of Education,(2011).

According to the Saudi Ministry of Education (2016) the Saudi government is committed to provide ICT support to schools, such as: ICT resources, technical support, supervision and follow up, proper school buildings and infrastructure, human and financial resources and training. In addition, the Ministry of Education identified the headmasters' role by giving them all authority to supervise and follow up teachers' work, assess teachers' performance and control and monitor ICT implementation. Furthermore, the headmasters are required to employ ICT tools for educational purposes and should work to create an appealing school environment. Regarding the teachers' role, the Saudi education policy identified their roles regarding ICT tools as follows: employing ICT tools in classrooms, engaging the students and attending ICT training (Ministry of Education, 2016).

Accordingly, the Saudi education policy, particularly in the field of ICT, aims to integrate ICT tools in all education sectors. To confirm that, the Saudi Ninth Development Plan, 2014, with regard to Human Development, aims to increase the number of Saudi ICT professionals and expand the area of training in using technology (Al-Madani& Allaafiajiy, 2014). This plan is also aimed at maintaining world-class education for all the citizens of the country and providing the teachers with necessary ICT skills, which can further be used to achieve sustainable growth in the competitive global economy (Al-Sulaimani, 2010).

The Saudi educational policy covers most areas in ICT implementation. However, the Ministry of Education lacks administrative stability, for example, from 2013 to 2015, four ministers helmed the Ministry of Education, which stopped or disabled a number of projects. It also contributed to the lack of stability and clarity in the future vision of the ministry, which led to weakness in the ICT Policy and strategies to translate it into action (Alshaya, 2015a).

In addition, some Saudi educators believe that the lack of clarification of the educational policy and strategies is one of the problems that might hinder the introduction of ICT in Saudi schools. For instance, Al-Sulaimani (2010) believes that a lack of clarification in policies and planning often leads to misconceptions and ignorance about ICT tools. Therefore, several educators in Saudi Arabia have called for clear policy planning in terms of ICT implementation in schools. For instance, Oyaid (2009); Almadhour (2010); Almalki & Williams (2012); Al-Harbi (2014) and Al-Oteawi (2002) posited that the Saudi government needs to develop an effective strategy for ICT in education and to implement it in practice.

Almadhour (2010) concluded in his study, *'Unfortunately, although the Saudi Arabian government has lots of funding, there is no clear strategic framework towards equipping ICT in schools.'* (p.62)

Alsulaimani (2012), in his study *"What Impedes Saudi Science Teachers from Using ICT?"* found 76% of participants agreed that there is no clear strategy for ICT implementation in their school and considered a barrier to integrating ICT into their curricula.

Consequently, there is no meaning in just investing huge amounts of money to equip schools with ICT tools unless they are used effectively (Tezci, 2009). Hence, the greater availability of technological resources in the classroom does not necessarily equate to improved academic achievement (Ungerleider & Burns, 2003; Wozney et al. 2006). It can be argued that a clear framework and understanding of areas in policy that are unclear is therefore critical for ICT development in Saudi Arabian schools.

b) Policy translated into action

A number of projects suggested by the Saudi Ministry of Education illustrate its commitment to translate their policy into actions regarding the idea of ICT usage in secondary schools. For example, school libraries have been transformed into Learning Resources Centers (LRCs). More than 1500 computer labs are open in schools across the country and the Digital Technical Centers (DTCs) have been launched in various educational regions of Saudi Arabia to meet the needs of students in these areas. Moreover, computer skills are now mandatory for all Saudi teachers to get their qualification (Al-Madani & Allafiajiy 2014).

The 'Computer Based Labs' project is another example which has been established in schools across the country to blend ICT with education (Almaghlouth, 2008).

However, despite the positive objectives of this project, it does not stand out from the rest of the plans suggested by the Ministry of Education. The reason for such lack of efficiency was its implementation in only selected schools and the absence of further extension to all educational institutions (Oyaid, 2009).

In 2000, importance had been shifted to the employment of ICT and resource advancement and the setting up of electronic societies. In this regard, the 'Watani Net Project' was launched. The aim of this project was to connect all Saudi educational institutions by means of an internet network. The main purpose of this project is to provide interactive educational resources for teachers and students and to employ computers in a variety of educational activities. In addition, other purposes are to train and build educators' ICT skills and proper handling of them to facilitate teaching and learning processes. A project has been commenced linking schools and learning dictates through use of a broad area network, which spans the whole country (Al-Shagran, 2010; Arab News, 2014).

Despite the noble aims of the Saudi government policy regarding ICT programs, the government still faces many problems in order to translate this plan into action and to achieve the objectives of these projects. In this matter, Simpson (1998) says the development of policies and strategies without translating them into action is a waste of time and effort. Robertson & Al-Zahrani (2012) indicate that this is apparently due to factors such as financial support, cultural environmental shock, lack of teacher preparation and training for technology use.

In addition, funding constraints, overlapping programs, technological change and cultural distrust regarding ICT have frustrated the intentions of the Saudi Ministry of Education to integrate ICT into the secondary school curriculum (Al-Sulaimani, 2010). Hence, today the importance of ICT in Saudi Arabia is still underestimated, which substantially hinders the implementation of the new plans and initiatives (Al-Sulaimani, 2010). The current study lays emphasis on factors that prevent the translation of ICT policy into action and proposes a framework and recommendations that can help address the limiting factors.

c) Work in partnership

In recognition of the transformational nature of ICT, Saudi Arabia's government has placed great importance on diffusing technologies throughout the nation – across the public and private sectors and civil society. Therefore, one of the Saudi National ICT Plan (NICTP) objectives, approved in 2007, is to work in partnership (Ministry of Communication and Information Technology, 2015a). For example, the 'E-Caravan Initiative' was launched in 2011 cooperatively by the Ministry of Education, Ministry of Economy and Planning and the Ministry of Communications and IT. Consisting of a fleet of five vans equipped with internet connection and computers, the aim of this initiative is to increase technological literacy through focusing on youth in countryside areas and the general population with low-income by providing free basic training on the use of computers. This initiative was conducted through mobile classrooms using methods specified by the Ministry of Education and staying for one week in each village, providing ten hours of sessions for each group each week (Al-Khalifa, 2013).

Within the framework of the NICTP plan, the 'Dissemination of Digital Culture and Knowledge Lectures' aims to promote the significance of ICT in modern education, with a focus on young people. Students from each level, as well as the general public can attend sessions dealing with all aspects of modern ICT, including e-services, computer crimes and the advantages and disadvantages of e-communication. Cumulative statistics have shown 194,592

students attended the lessons since the project's inception (Ministry of Communication and Information Technology, 2015b).

Another example of working in partnership, The Home Computer Initiative, launched in 2005, between the Ministry of Education and Communications & Information Technology Commission (CITC), with the aim of helping one million Saudi families to obtain a computer device through facilitating instalment payments over five years. The main objectives of the initiative are to increase computer and internet penetration, as well as contribute to educating the public in the use of ICT equipment and the internet (Alshmrany, 2012).

Women in Technology Saudi Arabia (WIT Saudi Arabia) is an initiative managed by the Institute of International Education (IIE) West Coast Center funded by the Middle East Partnership Initiative (MEPI) of the U.S. Department of State and implemented in collaboration with several partners in Saudi Arabia. The Initiative endeavours to empower Saudi women by providing training opportunities in ICT and professional development (NUSACC, 2010).

In 2010, the Ministry of Education with two partners, ITG Company and Deloitteies, launched the 'Noor' Program (Educational Management System). This system is a comprehensive educational process which serves 33,000 schools, teachers, students, educational directors and parents as well and which offers them more than 2,763 online electronic services. It helps with the school timetable, work schemes, students' progress reports, assessment of teachers, as well as staff and students' admission details, through a database linked with other systems. Noor SMS is one of this system's services, through which the headmaster can communicate by text-messages with teachers, students and parents (Noor, 2011).

Although there is evidence of involving various groups, however, the Control and Investigation Board in Saudi Arabia, in its report on the fiscal year 2013, found failure in more than 1,000 projects in the state and The Ministry of Education had the highest number of failed projects (498 projects). With regards to ICT projects, it seems that the failure in these projects is related to the lack of a policy from the Saudi Ministry of Education and their failure to follow-up and supervise (Al- Juhani, 2014). This is in line with the study framework, which indicates that working in partnership is one of the government's responsibilities regarding ICT implementation. Therefore, this study will examine how this factor could help in ICT implementation in Saudi secondary schools.

d) Support, Encouragement and Collaboration

In recognition of the transformational nature of ICT, Saudi Arabia's government has placed great importance on diffusing technologies throughout the nation – across the public and private sectors and civil society. In addition, it supported this integration in education across many initiatives and projects that have been mentioned earlier.

However, and in spite of this support, an integrated approach to ICT implementation in education is needed, meaning not only investment in infrastructure and equipping schools through ICT tools, but also a different approach to supporting and encouraging ICT implementation in schools. In this matter, a report issued by the Ajel (2015), after many interviews with Saudi educators, summarizes the reasons behind the failure of ICT use in Saudi schools.

The report states that the Ministry of Education should pay attention to the importance of having incentives for teachers, as the current incentives are not convincing and do not distinguish between productive and negligent teachers. The report stated that the reason for the success of teachers in their profession is full satisfaction and facilitating this is the role of the Ministry of Education. They should honour the teachers based on their results and sort the wheat from the chaff, so as not to spread the spirit of indifference. Furthermore, the Ministry of Education, should realise that the absences of clear systems and procedures for effective processes hinders ICT development in schools (Ajel، 2015).

As the existing systems are very old and do not fit with contemporary educational methods, there is a shortfall in assessment of teachers' performance. The report attributed the reason for shortfalls in using ICT to "Salary in the account, last month, for all without discrimination". This causes many teachers to stop caring. The report further proposed that financial rewards or reducing the quotas quorum for teachers who use ICT in their classrooms would represent support and encouragement (Ajel, 2015).

Another challenge facing the implementation of ICT in Saudi schools is the lack of collaboration between the Ministry of Education and schools. As an example of this, Alshumaim & Alhassan (2010) stated that, despite more than 44% of secondary schools in Saudi Arabia lacking the proper infrastructure to support ICT learning, the government does not seem to be aware of such a problem. They add, 80% of teachers teaching ICT (as a subject) face numerous challenges when developing proposals and asking for budgets for ICT learning infrastructure.

They concluded that the only way to develop ICT learning content and deploy ICT learning programs effectively was through the collaboration of the Ministry of Education and schools. As Almaghlouth (2008) contends, only 20% of secondary schools are involved in ICT content and curriculum development. Therefore, the selected population does not represent the whole country as different regions and different schools have different modes of learning and challenges. The study will focus on the role of the government in terms of support, encouragement and collaboration between schools and the Ministry of Education.

e) Follow-up and supervision

As mentioned above, another problem hindering the adoption and learning of ICT in Saudi secondary schools is lack of Ministry of Education follow-up and supervision (Hakami et al. 2013). Yildirim (2007), in a study reviewing the ICT barriers in education, emphasised that supervision and follow up is vital at all levels, including teachers and students. Almalki & Williams (2012) suggest that in spite of developing numerous strategies for promoting ICT learning in schools, the Saudi Ministry of Education has failed to put in place strategies ensuring that learning programs are effectively deployed and followed. For example, the Control and Investigation Board (CIB), in its report on the fiscal year 2013, found failure in more than 1,000 projects in the state. The Ministry of Education has the highest number of failed projects (498 projects). In regards to ICT projects, it seems that the failure in some Ministry of Education projects related to the lack of Ministry of Education follow-up and supervision (Al- Juhani, 2014).

In addition, lack of progressive evaluation and supervision explains the ineffectiveness of ICT integration in Saudi classrooms (Hakami et al. 2013). Ongoing evaluation is important for establishing the effectiveness of any reform initiative. This enables the identification of faults and correction before they escalate. Moreover, ICT teachers are not supervised and their teaching plans are not verified by the relevant authorities. According to Bingimlas (2009), only 30% of ICT tutors in Saudi Arabia have detailed lesson plans and materials for teaching ICT in secondary schools.

Al-Hammad (2000) examining the challenges facing Saudi supervisors, observed several barriers, such as: lack of trust between teachers and supervisors; lack of headmaster collaboration; and lack of relationships between supervisors and teachers. Alkrdem (2011) attributes the lack of relationship between teachers and supervisors to the supervision practices: questionable practices associated with victimisation, inconsistency, intimidation, confusion

and biases. Furthermore, some supervisors lacked the necessary supervisory skills and some were not serious about their roles. As a result, teachers do not take their role seriously.

Alkrdem (2011) also indicates, that instructional supervision is characterised by conflicting role expectations that cause mistrust and stress for instructional supervisors and teachers. Therefore, the development of clear policies on instructional supervision is an area needing the greatest attention. Research also suggests that the Ministry of Education does not have enough manpower to supervise ICT learning in secondary schools. The research suggests that one supervisor is attached to up to 50 secondary schools (Oyaid, 2009). Generally, lack of enough manpower to supervise ICT learning in secondary schools has greatly affected the delivery of ICT knowledge to secondary school students in Saudi Arabia.

From the above and previous reading, there is a need to assess the gap in the levels of supervision and follow-up. Although these procedures are vital in any formal learning system, there is limited literature in the Saudi context that shows the streamlined protocols and procedures that the Ministry of Education have in place to support supervision and follow-up. Therefore, there is need to ensure instruction, curriculum and all enabling factors have clear supervision and follow up protocols. Hence, this study will evaluate this aspect (supervision and follow-up).

f) Staff Training

ICT training is the key factor for the successful implementation of ICT in classrooms as it focuses on increasing awareness of educational technology, changing negative attitudes towards educational technology, enhancing technical efficiency and might be a solution for the issue of incompetence and poor results (Almalki & Williams, 2012).

Saudi ICT educational policy takes into consideration all stakeholders involved in the usage of ICT in education. The Saudi policy therefore gives attention to teachers' ICT training as much as it emphasises its importance for students and offers them a number of opportunities to gain or improve their ICT skills. Therefore, the Saudi Ministry of Education in its ten-year implementation plan (2004-2014), implies that all teachers should have the opportunity to take 'Intel courses' on computers at their schools. In addition, school personnel can participate in the training programs held in their school districts (Al-harbi 2014).

In 2007, King Abdullah Bin Abdul Aziz initiated a big project 'Tatweer', which concerned the development of public education in the Kingdom of Saudi Arabia. This project involves continuing professional development for those working in the education sector, to assist in

developing the curriculum and learning materials, to improve the school environment, to promote the learning process, to provide ICT tools to all schools and to support extra-curricular activities, from pre-school to secondary school stages, at an expense of 11 billion riyals (£2 billion) (Tatweer, 2015).

As a result, in 2011, more than 1,700 male and female teachers from different Saudi schools took part in the training program in several cities. The purpose of this training was to learn how to replace traditional teaching methods with modern technologies (Alenezi, 2015). Moreover, the program showed how teachers could apply ICT tools in monitoring the academic advancement of students and creating new classroom settings.

The Ministry of Education has adopted several training programs in ICT. However, many studies (Almaghlouth, 2008; Oyaid, 2009; Al-Alwani, 2005; Al-Oteawi, 2002) have confirmed that the ICT training programs in Saudi Arabia are still below standard and do not meet the teachers' requirement. This was confirmed by Al-Oteawi (2002), stating that 98% of Saudi teachers feel the urgent need to improve their ICT skills and knowledge.

Al-harbi (2014) found in her study that more than two thirds of teachers had not undertaken any ICT training. Furthermore, she indicated that the Ministry of Education had provided limited opportunities in ICT training and half of teachers indicated that they had never had any professional development training, despite the majority of those teachers having 15-20 years teaching experience.

A study conducted by Alghamdi (2011) examined the perceptions of 202 Saudi teachers in Jeddah City regarding ICT effectiveness in teaching. The main finding of this study was the lack of ICT training as a key barrier that prevented them from using ICT in their classrooms. Similarly, Alsahli (2012) conducted a study to investigate the ICT training needs of Saudi female teachers in secondary schools in Jeddah. The study aimed to examine the teachers' training needs in terms of 'Usage', 'Knowledge' and 'Production' of ICT. The study concluded that there is a clear gap between knowledge and use of technology, which reflects a lack of training for teachers on both technical and pedagogical use.

Alotaibi (2011) investigated the use of ICT tools by female Saudi science teachers in their lessons. The results indicate that the teachers rarely use ICT tools in their lessons. In addition, all teachers from all stages, including secondary teachers, who are the priority for the Ministry of Education, lack basic ICT skills. Al Mulhim (2013) argues that there is a crucial need to develop an in-service training program in ICT for teachers that uses the most popular theories in the field as well as meeting the teachers' training needs.

Finally, the cooperation of teachers is another factor that motivates the personnel to use ICT tools in classroom activities (Oyaid 2009). Thus, scholars point out that it is necessary to indicate all hindrances to ICT implementation by teachers because their participation is crucial in achieving educational goals and building a new school environment based on ICT tools.

To sum up, the government have a role in ensuring that teachers have developed skills and are provided with training continuously to meet the needs of the ICT curriculum and instruction. Additionally, the teachers should take responsibility to develop ICT skills and to engage in ICT training. This will not happen if they are not fully aware of the importance of training and the importance of ICT tools in their lessons.

The literature review showed that Saudi teachers are in need of more training, as are many teachers in developing countries. However, the literature emphasized the necessity of encouragement and support to increase teacher attendance at training sessions. Furthermore, the importance of pedagogy training should be emphasised above skill training. All these factors will be examined in Saudi secondary schools.

g) Technical support

Technical support and maintenance are important factors in integrating ICT at school. Kozma (2011) stated that teachers will have no interest in the use of ICT if they feel they will face technical problems that need a long time to fix.

According to Becta (2004), *"if there is a lack of technical support available in a school, then it is likely that preventative technical maintenance will not be carried out regularly, resulting in a higher risk of technical breakdowns"* (p. 16). Therefore, when equipping schools with ICT resources with no technical support, any technical problems will decrease ICT access until the problems are resolved. It is argued that there is a relationship between the lack of technical support and teachers' access to ICT equipment at school (Becta, 2004). Multiple studies have shown that Saudi Arabia's limited technical support to ICT has been a major obstacle in the application of electronic technologies in education (Almohaissin, 2006; AL-Harbi, 2014; Ghamrawi, 2013).

Al-Sulaimani (2010) examined the importance of teachers in integrating ICT into Science teaching in intermediate schools in Saudi Arabia, he concluded that insufficient technical support for using ICT was of immediate concern to 85% of teachers, who considered it a strong factor preventing ICT integration in education.

A study carried out by Almaghlouth (2008) in Saudi Arabia reported technical problems are one of the major barriers to ICT in schools. This lack of technical support can be explained by the rising cost of ICT technology in schools (Al-Sulaimani, 2010). Furthermore, Bingimlas (2009) suggests that technical barriers in Saudi schools often hinder the natural flow of the study activities, which prevents teachers from extensive usage of ICT in classrooms.

Balanskat et al. (2006) proposed that, to avoid such problems, the Ministry of Education should pay attention to providing sufficient technical support services as well as maintenance contracts for ICT in order to guarantee that ICT tools work effectively. In addition, Lim and Khine (2006) suggested that schools should request technical assistance in order to troubleshoot ICT problems and fix them.

Hew and Brush (2007) agreed with this point of view, adding that provision of an adequate amount of technical support in schools substantially increases teachers' technology use. Preston et al. (2000) emphasized the importance of technical training, such as solving technical problems or understanding the principles of technologies' functioning because the breakdown of tools not only stops the flow of the lesson, but also prevents teachers from using ICT in classroom activities. Understanding of the challenges attributed to the technical limitations of the teachers and support available is therefore crucial to this investigation.

5. ICT as a Subject

According to Voogt et al. (2013), successful implementation of ICT in schools is a complex and multifaceted process that also depends on other aspects such as teachers' competencies, curriculum restructuring, schools' readiness and long term financing and quality of the ICT, among others. Of late, the Saudi government, through the Ministry of Education, has made remarkable progress which exemplifies its commitment to integrate ICT to improve the country's education system as well as development of the national curriculum (Tatweer, 2015).

However, although ICT is a mandatory subject in all Saudi secondary schools, it has not yet been fully activated as a taught subject (Almalki & Williams, 2012; Alshmrany & Wilkinson, 2014). The current situation of ICT as a subject has faced significant criticism. For example, Bin-Shewaia (2014) observes that ICT subject at all levels in Saudi schools is still deficient and needs development. It is not compatible with modern technology. It is just about basic computer skills in most of its content and this does not accommodate young learners who are interested in various technology fields.

According to Almalki & Williams (2012), approximately 44% of the secondary schools in Saudi Arabia do not have the necessary ICT infrastructure, an aspect that significantly hinders adoption of ICT as a compulsory subject. The authors further indicate that a significant proportion of the schools that are equipped with ICT infrastructure use outdated equipment.

These views are supported by Alshumaim & Alhasaan (2010) who identified that lack of new technologies, labs and teacher skills are hindering ICT integration in the classroom. Similarly, Alshmrany and Wilkinson (2014) argue that about 30% of the content being taught in secondary schools is out of date.

In this regard, Bingimlas (2009) indicates that 56% of secondary schools in Saudi Arabia have not allocated a specific time for learning ICT and students only access ICT facilities during break time or other free time. He also identifies a poor curriculum as well as insufficient skills and support as hindering ICT in Saudi Arabian schools. Similar work by Oyaid (2009), who interviewed 14 head teachers and 266 teachers drawn from secondary schools in Riyadh City in Saudi Arabia, confirms that application of ICT does not follow the Ministry of Education policy and that the curriculum is weak and recommends a radical change.

Robertson and Al-Zahrani, A. (2012), in a study review in Saudi Arabia, showed that training and skills improved how teachers performed in ICT and integrated skills in classrooms. However, there perceived efficacy and actual application of knowledge was affected by resistance to change to the new curriculum. The authors recommend strategic leadership as well as effective curriculum design and innovative pedagogies to sustain outcomes.

6- Resources

a) *ICT material*

Although the Saudi government has promised to provide all schools with ICT resources. However, growing number of studies state that insufficient ICT resources are a major hindrance factor for ICT in Saudi schools (Almaghlouth, 2008; Alsulaimani, 2012; Oyeid, 2009; Pelgrum, 2001; Al-Maini, 2011). In fact, the failure of learning and teaching in ICT tools, in Saudi classrooms, due to lack of supportive equipment and resources such as internet access, computers and computer labs (Al-harbi, 2014).

A study carried out by Hakami et al. (2013) in order to investigate critical success factors for ICT integration into the Saudi school curriculum shows that one computer serves about 10 students in each secondary school. Almaghlouth (2008) conducted research to explore the

Saudi Science teachers' perception of ICT usage to improve teaching and the learning process. The sample population for the qualitative survey was 131 teachers. Using questions like "which of the following tools do you use in your school?" and "how often do you use these tools?" Almaghlouth, found the projector device to be the most used tool at 56% and only 2% of the teachers that were interviewed used the internet during lessons. The study noted that students and teachers are limited in terms of access to internet and computer labs. Lack of skills could also be a limiting factor as established.

Alsulaimani (2012) studied what impedes Saudi Science teachers from using ICT. He found that the internet access and speed are not suitable for educational usage and that the dial-up connection is the main method of internet connectivity in Saudi schools. He found 71% (210 respondents) were fairly concerned or highly concerned about the perceived barrier to use through speed of connection and waiting time for pages to load.

b) Financial resources

In 2007, the Saudi Arabian government pumped in £2 billion in a bid to reform and improve the education environment through the use of contemporary technologies. Approximately 25 per cent of the country's expenditure in 2015 went to the education sector. This accounts for more than £36 billion, which is in addition to the already large expenditure pumped into the sector for the implementation of technological changes in terms of curriculum changes, as well as upgrading ICT facilities (Ministry of Finance, 2015).

Budgets for secondary schools are distributed independently and every secondary school has an independent yearly budget determined by the Cabinet's overall national budget. Despite this huge budget (Ministry of Education, 2016).

Nevertheless, despite the government's efforts to equip secondary schools with ICT facilities and infrastructure, studies recently carried out show that some secondary schools face difficulties in providing financial resources to solve day to day problems, such as cleaning and maintenance, as well as the purchase of printer ink and printing papers (Information centre, 2010).

Almannie (2015) states that the financial issues do not pose a problem in Saudi schools. He believes, there is a problem in planning and mechanism of implementation. The current study therefore assesses the participants' views, including the Ministry of Education, on the issue of financial resources and investment for ICT implementation in Saudi secondary schools.

c) Human Resources

The preparation and training of pre-service teachers in Saudi Arabia demonstrates the great efforts undertaken to ensure effective teacher training to meet the demands of the modern world. With the establishment of the Directorate of Education in 1924, a training programme was initiated with a focus on social and environmental needs. A further development was the creation of teacher preparation programmes within the whole country, when in 1953 the Ministry of Education took over responsibility for teacher training in both pre-service and in-service programmes (Oyaid, 2009).

The current teacher colleges were first established in 1989 and colleges of education at Saudi universities, for which the Ministry of Higher Education is responsible, offer a four year training programme to graduates to teach at any school level (Alshalaan, 2006), with different departments offering specialist subjects and academic preparation (Algabr, 1994), as well as the principles of learning, educational processes and theories, teaching skills and methodologies and methods of assessment (Al-Salloom, 1995; Bin Salamah, 2001). In order to qualify and thus to be eligible to work as a teacher, it is necessary to succeed in measurement of teaching skills, which includes an exam, which requires knowledge of a wide range of educational aspects.

However, despite teacher training colleges coming under the responsibility of the Ministry of High Education (universities), the progression in preparing teachers to use ICT in their lessons is still not adequate to meet the demands of technology and to encourage its use (Alwani, 2005; Al Mulhim, 2014). Furthermore, there is a lack of pedagogy preparation (Al-harbi, 2014). Oyaid (2009) stated that only 45% of ICT teachers have the relevant qualifications to teach ICT in secondary schools. As a result, the quality of education delivered to secondary school students in Saudi Arabia is greatly affected.

However, it has been mentioned earlier that there is a clear lack of pedagogy training of Saudi teachers with regard to ICT usage (Alshumaim & Alhasaan, 2010; Robertson, & Al-Zahrani, 2012; Almalki & Williams, 2012).

7- Creating an attractive learning environment

Other than the above highlighted roles and responsibilities, that the Ministry of Education has to meet in order to make the implementation of ICT in secondary education more successful, the Ministry of Education has a duty of creating an attractive learning environment by providing appropriate school buildings with good ICT infrastructure.

the Final Study Report (2013) summarised most of the factors that can make the use of ICT in schools more successful, which should be taken into account by governments when adopting any initiative to apply ICT in schools. Firstly, a school should be well equipped digitally, which involves high connectedness, with access to fast broadband. It should also be provided with good ICT facilities such as email, virtual learning networks, libraries and websites and relevant equipment.

Secondly, the government should prescribe diverse measures to ensure the availability of ICT equipment at the moment of request. From the literature, there seem to be gaps in this role as established in early sections of this chapter. Laurillard (2013) believes that there is a direct correlation between the availability of ICT facilities and infrastructure and the success of ICT implementation processes in schools.

In the Saudi context, as stated earlier, the government, through the Ministry of Education, has made strenuous efforts to make education more interesting in terms of ICT initiatives and projects. However, it seems that the rapid growth of the population is a big problem straining the government, including the growing number of students, as Saudi Arabia is the most populous country in the Gulf region and its population has doubled four times over the past forty years (AL Riyadh, 2012). This issue has pushed the government to develop the state infrastructure. For example, in 2012, the Saudi government allocated about £ 24.7 billion for the development of infrastructure, including the building of schools and universities. According to figures from the kingdom's budget for 2011, in that time, there were 3,200 new schools built and 600 schools were planned for building in the same year (Alshaya, 2015b).

In 2015, recent statistics showed that in 2014 about £3.1billion were invested in ICT, especially in in-house software, which accounted for almost half of ICT investment (47%) with IT equipment representing 26%, in addition to communication equipment (CITC.SA, 2015). It is evident here that the commercial and home industry maybe developing faster than the school environment, hence widening the already existing gap in schools and the general public.

The Saudi government is well aware of this issue. As mentioned earlier, it has launched a number of major programs that aim at equipping secondary schools with relevant ICT facilities and infrastructure. Furthermore, the ten-year implementation plan (2004-2014) states that the innovated infrastructure in Saudi school settings should be based on modern computers and software (Alenezi, 2015).

Alenezi adds, it seems there is another big challenge that faces the Saudi government in the old schools, because they had already been constructed before the advent of these technologies and do not have the capacity to facilitate ICT(Alenezi, 2015).

Several studies in the Saudi context have indicated that Saudi schools still lack the appropriate infrastructure. For instance, a report published by Al Riyadh newspaper indicates that, despite four ministers of education in Saudi Arabia within five years promising to find solutions for school infrastructure and to provide new schools, there are still more than three million students forced to study in non-sound environments due to poor infrastructure and lack of safety factors. This requires a quick solution (Alshaya, 2015b).

The report adds that the Ministry of Education should improve schools' learning environment, emphasizing that good teaching and learning cannot be achieved without creating an appealing school environment, in modern buildings that provide all necessary educational facilities. The report revealed that the number of schools needing restoration in 2015 exceeded 7000. In addition, the shortage of appropriate land to build new schools is another problem. The Ministry of Education needs more than two thousand plots of land over the next two years to provide the necessary schools. In addition, thousands of school building projects are already behind schedule (Alshaya, 2015b).

A study conducted in Saudi secondary schools by Albugami and Ahmed (2015a) found that the large numbers of students in classrooms limited the use of ICT. Respondents report a high average number of students. Class sizes are a significant limiting factor according to over 80 per cent of respondents. This may be linked to a lack of sufficient room to use ICT, with 88% of teachers agreeing on the space barrier.

3.6. SUMMARY AND CONCLUSION

This chapter has presented literature relevant to the study objectives (3 & 4). Reviewing the literature, the importance of ICT and the history of ICT in Saudi Arabia has been presented.

The chapter looked at the social and cultural aspects and how these have a huge bearing on the acceptability of ICT, as well as the government's role in shaping the direction of ICT use in the country through the control and law channels. There is a clear conflict between balancing the need for ICT in a rapidly developing world and safeguarding the culture and structure of the society. The Saudi government has invested in various ICT programs, however there is a gap in the quality of what is being delivered.

Traditional beliefs are deeply rooted and may be shaping how teachers as well as headmasters

adopt the ICT and integrate it into students' learning. Various internal and external factors that hinder or enhance ICT have been reviewed and various research studies presented views on effective ICT implementation. The chapter further highlights that although policies are in place, they are not translated in practise and there is need to look at the curriculum and resources as well as continued support, collaboration and supervision.

In Saudi Arabia there are several factors that hinder the implementation of ICT in education. For instance, there is a lack of government action in providing sufficient ICT resources, ICT training, financial resources and schools' infrastructure. Furthermore, there is a lack of an ICT policy. Other limitations relate more to schools themselves, like teachers' resistance to change and ignorance of benefits associated with ICT.

In conclusion, by applying the theoretical framework for the study, which appeared in the chapter two (section 2.6), this review of this chapter, in the Saudi context, shows great similarities between the barriers that prevent the application of technology in education in general and in Saudi secondary schools in particular, with some variations which showed a strong influence on the use of the internet, such as culture and religion. All the factors that have been identified in this chapter, as well as from the second chapter, will be examined during the interviewing of ICT users as well as the questioning by survey.

CHAPTER IV

RESEARCH METHODOLOGY

4. INTRODUCTION

Research methodology is *'a framework which is associated with a particular set of paradigmatic assumptions that are used by a researcher to conduct research'* (O'Leary, 2004, p.85). Allan and Randy (2005) stressed that in conducting a research methodology, it should meet two criteria; firstly, the methodology should be the most appropriate to achieve the research objectives. Secondly, it should be possible to replicate it in other researches of the same nature. This chapter aims to describe the research design, approaches, strategies and data collection methods, aiming at highlighting those used throughout the study to achieve its objectives. Furthermore, it aims to justify the study choice for its design, approach and strategy, through describing its affordances and constraints as well as taking into account their practical applicability to the study purpose.

4.1. RESEARCH DESIGN

Saunders et al. (2012) describe the research design as a general plan and an overall view of the research methodology, taking into account an explanation of the reasons behind each choice in order to answer the research question(s). In addition, it is necessary for the researcher to have a clear understanding about the purpose and the role of research design; what research design is and where it can be fitted into the whole research process, from framing the research aim, objectives and questions, to the final steps of analysing and reporting data.

The following section illustrates some research designs, in order to choose what fits this research and to clarify the reasons for this choice.

- ***Crotty Research Design Elements***

Crotty (1998.p4) classified research design into four aspects. He suggested that in research design, the researcher should consider four questions related to these aspects:

1) What kind of knowledge is possible and valid for the study? (***Epistemology***)
2) What philosophy informs the methodology? (***Theoretical perspective***)
3) What the strategy, plan of action, process, or design lying behind the choice and use of particular methods? (***Methodology***) and;
4) What techniques or procedures are used to gather and analyse data? (***Methods***).

- ***Nesting design***

Nesting model/design according to Kagioglou et al. (1999) has three aspects (Figure 4.1). The outer slice shows the ***research philosophy***, which is followed by the ***research approaches***. The ***research techniques*** are presented in the middle circle. In this design, the research approaches refer to the methods for generating theory and testing. For examples, survey, case study and action research, while research techniques refer to the techniques of collection of data such as questionnaire, interview, observation and focus group.

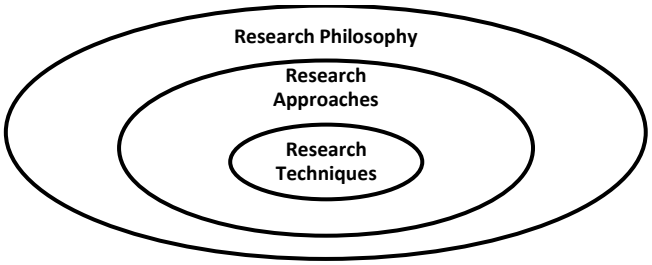


Figure 4.1: Nesting research design (Kagioglou et al. 1999. p131)

- ***Onion Design***

The third design is Onion Design, which was developed by Saunders et al. (2012), and has six sections. It starts by identifying the research philosophy, followed by research approach, research strategies, methodological choice, time horizons and the techniques and procedures used to collect and analyse data. (Figure 4.2).

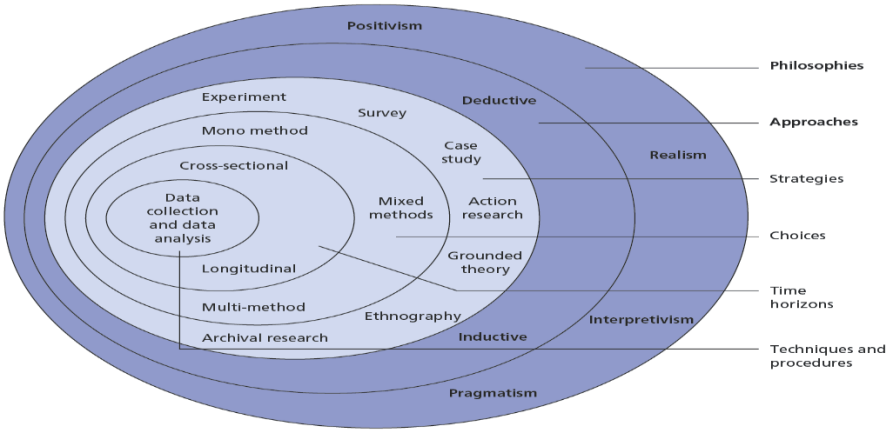


Figure 4.2: Onion Design. (Saunders et al. 2012 p. 160)

The study selected this design (Onion Design) to be a guide for the research methodology for several reasons. When comparing this design with previous designs, it can be seen that this design provides a clear picture for the complete research processes, and gives the researcher more freedom to explain each step in detail, for the research process. It also has a logical

sequence, which helps to guide the researcher to follow it step by step. The table below shows the comparison, similarities and differences, between the three designs.

	Onion Design Saunders et al. (2012.p128)		**Nesting Model/design** (Kagioglou et al. 1999. p131)		**Crotty's Design Elements** (Crotty, 1998.p4)
1	Research Philosophy	**1**	Research Philosophy	**1**	Epistemology
2	Research approach	**2**	Research approach	**2**	Theoretical Perspective
3	Methodological choice	**3**	Research Techniques	**3**	Methodology
4	Research Strategies			**4**	Methods
5	Time Horizons				
6	Techniques and procedures				

Table 4.1: The comparison between three designs

The following section describes the research philosophy**.**

4.2. RESEARCH PHILOSOPHY

According to Saunders et al. (2012), research philosophy is an over-arching term depending on the way the researcher thinks knowledge is created or developed, how people gain an understanding of things. In doing so, the research requires an open mind in order to establish facts for both new and existing mysteries. Research philosophy also plays role on the way in which the researcher sees the world (Johnson & Clark, 2006). Consequently, it influences the researcher's choice of methods and strategy of data collection (Saunders et al. 2012).

Therefore, in this step, it was necessary to clarify the research philosophy in order to use it in the way that helps the researcher to defend the study choices against the alternative philosophies. Furthermore, defining the researcher's philosophical stance, his/her views towards acceptable knowledge (epistemology), value (axiology) and the nature of reality (ontology) could offer a clear understanding of the research position and choice of data collection and procedures (Saunders et al. 2012).

Saunders et al. (2012) suggested that the researcher's way of thinking affects the way that he/she conducts the research. Accordingly, it is essential to consider a brief introduction of the four major research philosophical stances, which is suggested by Saunders et al. (2012), in order to define the position of this study. The four major philosophical stances (ways of thinking) are; positivism, realism, pragmatism and interpretivism), which will be discussed in light of their definition of acceptable knowledge (epistemology), ontology, and axiology in the following section.

- **Epistemology**

Saunders et al. (2012.p132), defined the concept of Epistemology as a philosophy which '*concerns what constitutes acceptable knowledge in a field of study'*. It deals with the nature of knowledge; how do we know things, what do we know, why we know it, is what we know true, and what are the limits of knowledge. For example, you may be reading something, but what is the nature of what you know, does it properly reflect reality (truth); is knowledge primarily gained through our sense experiences (empiricism) and is this knowledge primarily gained through reason (rationalism)? (Saunders et al. 2012).

- **Ontology**

According to Saunders et al. (2012, p.130) Ontology is *'The nature of reality'* which is categorized into two main branches, Objectivism and Subjectivism. Objectivism is the philosophical position which holds that *'social entities exist in reality external to social actors'* (p.131). Whereas, Subjectivism's view is that *'social phenomena are created from the perceptions and consequent actions of social actors'* (p.132). However, it is rather misleading to draw a line between these two ontological stances as they can be adopted in one research (Saunders et al. 2012).

- **Axiology**

The third element of research philosophy is Axiology, which is defined by Saunders et al. (2012, p.137) as a branch of philosophy that *'studies judgments about value'*. According to Heron (1996), the fundamental point is to determine what things are naturally good or bad for their own sake. The researcher can show axiological skills articulating his/her values as a basis for making judgments about what research is being conducted, and the strategies employed through adopting the suitable methodology that enables him/her to answer the research question/s and meet its objectives.

Due to the fact that this study adopts subjective ontology that is influenced by its interpretivism position, the researcher's value is part and parcel of what is being researched, and cannot be separated from the research. Subsequently, the research value will have its own impact on the research strategy, choices, techniques and procedures.

As mentioned earlier, Saunders et al. (2012) suggested four dominant philosophical positions which are: Positivism, Realism, Interpretivism and Pragmatism. The four philosophical positions are discussed below in light of their features, and the conclusion is presented with the study's philosophical position.

- **Positivism**

This philosophy is based on the view of natural science. It encompasses operating with observable and social facts, derived from logical and factual issues based on physical and natural sciences (Easterby-Smith et al. 2008). It advocates the view that the social world is made of facts which can be studied in a natural world. It tends to use quantitative data collection choices, and adopts an objective ontological stance.

- **Realism**

Realism advocates the depiction of things in their real forms as opposed to abstracts, and recognizes that objects have an existence independent of the human mind (Saunders et al. 2012). Realism can be divided into direct and critical realism. Direct realism reflects the development of knowledge that is more concerned with understanding the phenomena in light of its direct sensational reflection, which is highly influenced by the positivism philosophical stance (Saunders et al. 2012). Critical realism is a branch of realism that was developed later. According to Bhaskar (1989), the critical realism philosophical stance bridges the gap between positivism and interpretivism (will discuss in the following section). Critical realists tend to adopt the use of both qualitative and qualitative data collection techniques in order to build a flexible ontological position.

- **Pragmatism**

According to Saunders et al. (2012), when the researcher is not influenced by any philosophical stance, and his/her main focus is more concerned with the adoption of the steps that enable him/her to answer the research question/s and objectives, this researcher is a pragmatist. A pragmatist researcher tends to use a combinations of data collection techniques and adopts a variety of philosophical stances with no regard to their compliance with any school of thought, as long as he/she achieves his/her research objectives.

- **Interpretivism**

Interpretivism tends to understand the human action (Phenomenology), perceptions of participants and their view towards the research issue (Sexton, 2003). In the case of this study, it seeks to understand participants' perception (headmasters, teachers, students and directors of ICT in the Ministry of Education) of the phenomena under investigation (ICT implementation in Saudi secondary schools) to answer the research question/s and meet its objectives.

Accordingly, the study reflects the interpretivists' philosophy that puts more emphasis on the development of knowledge that is socially constructed. Driven by the notion that humans' actions (Phenomenology) are determined by their own choices, perceptions and ability to

control them (Sexton, 2003), the adoption of the subjectivism ontological stance is part and parcel of this study, as it tends to understand the phenomena through the meaning that participants attach to the phenomena under investigation. The following figure (4.3) summarizes the research philosophy.

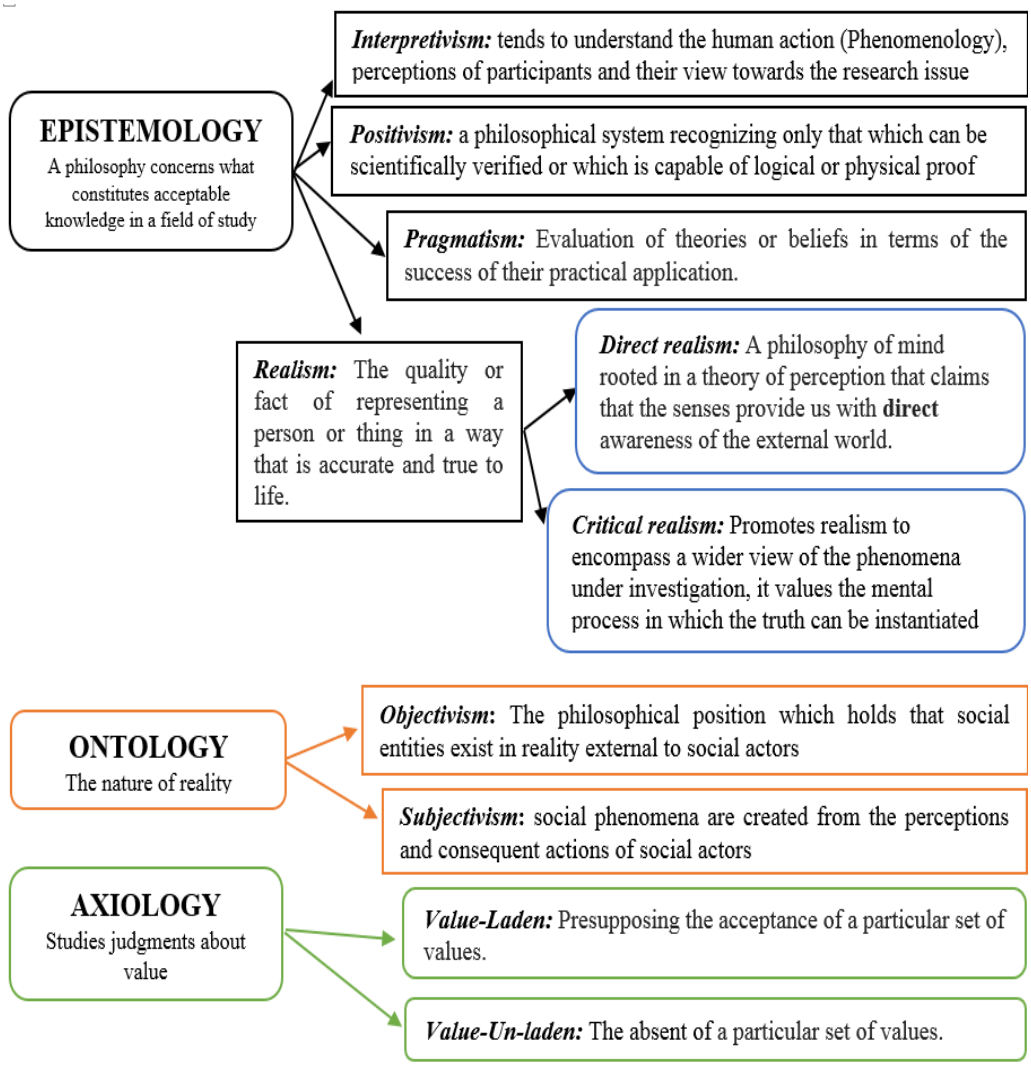


Figure 4.3: Summary of Research Philosophy, Designed from Saunders et al. (2012)

4.3. RESEARCH APPROACH

The concept of 'research approach' is related to how the researcher uses the theory when conducting the research, as it describes the researcher's choice when he/her conducts the study by identifying the research direction. Hence, the researcher could be able to make choices regarding the research design, strategies and data collection methods, taking account of the overall practicalities of conducting research. (Easterby-Smith et al. 2008).

Therefore, the choice of a proper research approach is vital in answering the research question/s (Patton, 2002).

According to Yin (2014), there are two research approaches where theory can be introduced, and the researcher should be clear about the theory before conducting the research: Deductive and Inductive. In the case of deductive, a theory and hypothesis (or hypotheses) are developed, and a research strategy designed to test the hypothesis. Whereas, within inductive, data are collected and a theory is developed as a result of the data analysis (Yin, 2014). Figure 4.4 outlines the steps involved with deductive and inductive approaches to research.

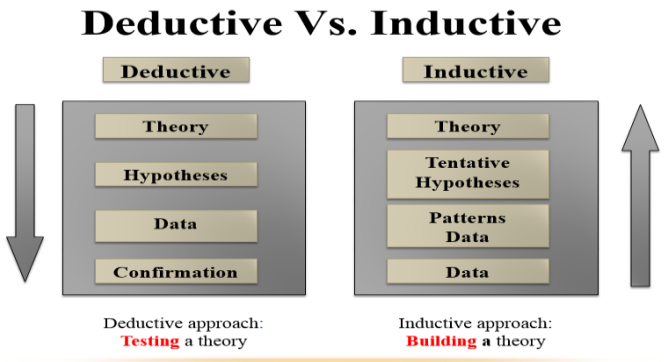


Figure 4.4: Differences between Deductive and Inductive approaches Blackstone (2006)

However, Creswell (2003) mentioned that if there is a rich literature review available on a research topic and if it is probable to state a theoretical framework, that research is more likely to be a deductive approach, which is the case in this research. Therefore, the study selected deductive approach (primarily) as it starts with a social theories (literature review) that the study found compelling, to explore the current implementation of ICT in education in order to formulate the study framework, and then test the theories' implications with study data. That is, the study moves from a more general level to a more specific one.

This approach is the one that people typically associate with what others have done, study existing theories of whatever phenomenon they are studying, and then test hypotheses that emerge from those theories.

During the progress of this research, the employment of the inductive approach becomes necessary for establishing the proper strategic framework to ICT implementation in Saudi schools. During the progression of the study, new themes have emerged, which helped to formulate new theories (Change in the initial study framework).

Two approaches were used in research in what is called abduction approach, which is neither moving from theory to data, nor from data to theory; it goes back and forth, and deeper than

the other two approaches. It seeks to obtain an understanding of underlying patterns of a phenomenon (Saunders et al. 2012; Alvesson & Skoldberg, 2000).

In summary, this study used the abduction approach that is utilized in features of those inductive and deductive approaches.

4.4. RESEARCH STRATEGIES

Saunders et al. (2012, p.173) stated that the research strategy is a *"plan of action to achieve a goal… a plan of how a researcher will go about answering the research questions*". They confirm that the way in which the researcher chooses to answer the research question/s is highly linked to the research philosophy and approach, as well as (which is highly important) the research purpose. Therefore, it was critical, in this stage, to identify the study purpose before discussing in detail the research strategy.

- **The research purpose**

Lawrence (1997) classified research purposes as exploratory, descriptive, and explanatory research. ***Exploratory research*** is the case where the research objective is to find out or draw attention to issues of phenomenon under scrutiny. It is also used to obtain evidence to answer a 'what' type research question. ***Descriptive research*** refers to the case when the researchers attempt to describe the nature of a phenomenon under study. It is suitable for obtaining data prior to collecting data in exploratory research.

While, **e*xplanatory research***: is targeted at offering contributory clarifications regarding phenomena. Its stress is on observing circumstances or an issue, so as to clarify the association between the study variables. The objective of a study may be combined with these classes, subject to study queries and research aims (Saunders et al. 2012).

Accordingly, this study, primarily, is an exploratory research as part of an explanatory research. Combining the aforementioned two purposes according to (Saunders et al. (2012) helps the researcher not only to explore a phenomenon but also to explain and describe why it happens. For example, this study intends to explore the current implementation of ICT in Saudi secondary schools; it focuses on exploring the situation and problems of ICT, as well as explaining all the dimensions of the problem and its causes.

Creswell (2003) provides an example of a scenario in which the adopted research purpose can be situated. For example, where the researcher wants to both generalise the findings to a population and develop a detailed view of the meaning of a phenomenon or concept for individuals, the researcher may first explore issues in a qualitative manner to get insight into

study variables, and then investigate those variables with a large sample of individuals quantitatively. This scenario mirrors this research, and justifies the appropriateness of the approach being adopted for this research.

In the previous sections, the study selected the research design, philosophy and approach, which paved the way to identify the strategy of this research. One way of choosing an appropriate research strategy is to review different research strategies and discuss what fits them for this search, in light of the objectives, questions and purpose of this research, which can offer a way of justifying the research's strategic approach in the following section.

- **The research strategy**

According to Saunders et al. (2012) research strategies can be classified into seven categories. Each category has strengths and weaknesses. They suggested that no one is greater than another or cannot be used as part of another strategy. These strategies are discussed briefly in the table below, in light of their characteristics.

Strategy	***Description***	***Suitability to search***
Action Research strategy	The researcher engages in a cycle of actions, starting by diagnosis of the problem, then planning for an act to take place, and finally assessment (Coghlan & Brannick, 2005).	Inappropriate for the study purpose and scheduled time.
Experiment Strategy	Tends to study causal relation between variables, which involves assigning two participants' groups and a planned intervention or manipulation (Hakim, 2000).	Not applicable, because there is no need for intervention or assigning of experimental groups.
Ethnographical Strategy	The researcher is required to immerse him/herself completely in the phenomena context over an extended period of time (Saunders et al. 2012).	Inappropriate, nor a feasible strategy to adopt in this study because of limited access and time.
Survey Strategy	Saunders et al. (2012) suggests the collection of quantitative data to be analysed using inferential or descriptive statistics	If this strategy is used exclusively in this research, this will limit the study variables to particular methods of analysis. In this case, it will be used as part of the study strategy.
Grounded theory strategy	The researcher is able to start collection of data directly, with no need for theoretical framework or theory to lead the investigation (Glaser & Strauss, 2009).	Inappropriate to this study, as this study is based on the theoretical framework that has been drawn from the literature to lead the study investigation.
Archival research	Data source is limited to administrative records and documents (Bryman, 1989).	Does not serve the study purpose of investigating the phenomena from four different perspectives (ICT directors, headmasters, teachers and students).
Case study strategy	In this strategy, multiple sources of evidence are used to investigate a particular phenomenon in its real nature (Robson, 2002)	Very suitable for this research. See the explanation below.

Table 4.2: Research strategies

According to Robson (2002), a case study strategy is used when multiple sources of evidence are available in order to investigate a particular phenomenon in its real nature. This type of strategy helps the researcher to gain a rich understanding of the research phenomenon, through the use of different data collection techniques. In addition, it helps to triangulate collected data from multiple resources, to promote the trustworthiness of the findings (Yin, 2014). While, Saunders et al. (2012) confirm that case study strategy can help the researcher to answer questions such as; what is happening, why and how it is happening, which makes it a widely used strategy in explanatory and exploratory research.

Based on this, the current research will use a case study strategy, as it obtains a clear understanding of the phenomena under investigation (ICT implementation) through multi-level sources (ICT directors, headmasters, teachers and students), to gain insights from the real context (secondary schools in Saudi Arabia as a case study).

By using a case study strategy, the current study will be able to serve its purpose of exploring phenomena through answering the question of what is happening in Saudi secondary schools with regard to the implementation of ICT tools, using collected data from multiple resources such as interviews and survey. Furthermore, it helps to serve the explanatory stage of this study through its rich understanding of the context to answer the question of why ICT tools were not implemented effectively, and how ICT can be implemented successfully in Saudi secondary schools.

To sum up, and based on the characteristics of the research problem, the research questions and objectives, the philosophical underpinnings of the researcher, the extent of existing knowledge on the subject area to be researched and the amount of time and resources available, this research sought to adopt the case study strategy as the appropriate strategy for this research, because it is the most flexible strategy for most research designs (Yin, 2014).

4.5. METHODOLOGICAL CHOICE

According to Saunders et al. (2012), in choosing research methods the researcher either selects a single data collection method and corresponding analysis procedures 'Mono method', or selects more than one data collection method and analysis procedures 'Multiple methods', to answer the research question, and the single research study may use qualitative and quantitative techniques and procedures in combination. (Figure 4.5).

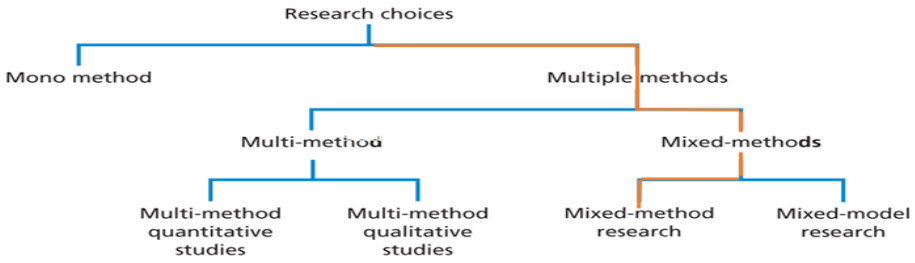


Figure 4.5: Methodological Choice (Saunders et al. 2012, p. 165)

Tashakkori & Teddlie (2003) stated that if the researcher chooses to select a mono method, then he or she will combine either a single qualitative data collection technique, such as in-depth interviews, with qualitative data analysis procedures, or a single quantitative data collection technique, such as questionnaires, with quantitative data analysis procedures. On the other hand, if the researcher chooses multiple methods, there are two different ways, multi method or mixed methods.

In multi method, the researcher can use more than one data collection technique with associated analysis techniques, but this is restricted within either a quantitative or qualitative world view. Consequently, the researcher might choose to collect quantitative data using, for example, questionnaires and structured interview analysing; both are analysed statistically (quantitative) procedures, and this choice called 'a multi-method quantitative study'. Instead of this, the researcher might choose to collect qualitative data using, for example, in-depth interviews and discourse, and these data are analysed using non-numerical (qualitative) procedures; this choice is called ‘a multi-method qualitative study.

Therefore, if the researcher adopted multi-methods he or she would not mix quantitative and qualitative techniques and procedures. Following (Johnson & Christensen, 2004), the second choice, mixed methods approach, is divided into two types: mixed method research and mixed model research. In mixed method research, the researcher might use quantitative and qualitative data collection techniques and analysis procedures, either at the same time (parallel) or one after the other (sequential), but does not combine them. On the other hand, mixed-model research combines qualitative and quantitative data collection techniques and analysis procedures, as well as combining qualitative and quantitative approaches at other phases of the research, such as research question generation. To sum up, this study will use mixed method research and analysis procedures sequentially. According to Cameron (2009, P.144.) sequential analysis procedure is *“One type of data that provides a basis for collection of another type of data”*.

4.6 TIME HORIZON

Saunders et al. (2012) classified the research time horizons into two types, cross-sectional and longitudinal. Cross-sectional research is described as research which investigates a phenomenon at a particular time. However, a research investigating change and development over a time period is called Longitudinal. Based on this, this study does not aim to investigate phenomena changes over the time, and there is a limitation on time in which to be conducted. Therefore, this research is not a longitudinal study. As this study can be achieved by investigating the phenomena within a particular time, the study, therefore, is in a cross-sectional study's time horizon category.

4.7. DATA COLLECTION METHODS

There are many ways of collecting responses from participants. For example, the common data collection methods in qualitative research are: in-depth interviews, observation and focus groups (Hancock et al. 2007). In quantitative research, common data collection methods are; questionnaires, structured observation and structured interviews (Gill et al. 2008).

According to Harris & Brown (2010), Semi-structured interviews and structured questionnaires are often used in a mixed method to generate trustworthy results despite differences in techniques of data collection, analysis procedures, and interpretation. Therefore, this study selected two data collection techniques (interviews and questionnaires) to collect data from its participants. In the next sections, the two data collection techniques used in the study are presented in light of their definitions, justification of use and related issues of validity and reliability. This is followed by their sampling techniques, and their associated analysis procedures.

4.7.1 The Interviews

The qualitative research interview is a method which seeks to describe the meanings of central themes, in the life of the subjects. The main task in interviewing is to understand the meaning of what the participants say and furthermore, to cover both a truthful and a meaning level (Kvale, 1996). It is particularly useful for getting the story behind a participant's experiences, which could help the interviewer to pursue in-depth information around the topic. (McNamara, 1999).

The Interviews can be grouped into three types depending on the needs being addressed and the information; structured interviews, unstructured interviews and semi-structured interviews.

In a structured interview, the interviewer asks a set of standard, predetermined questions about particular topics, in a specific order. The interviewees need to select their answers from a list of options. The interviewer may provide clarification on some questions. This method is typically used in surveys.

In an unstructured interview, the interviewer has no specific guidelines, restrictions, predetermined questions, or list of options. The interviewer asks a few broad questions to engage the respondent in an open, informal, and spontaneous discussion. The interviewer also probes with further questions and/or explores inconsistencies to gather more in-depth information on the topic. Unstructured interviews are particularly useful for getting the stories behind respondents' experiences or when there is little information about a topic.

Semi-structured interview is in between the structured and unstructured interviews; the interviewer can have a list of themed areas where the responses are recorded, or can follow prearranged criterion questions with some probing for clarifications and explanations, and the respondents answer in their own words. It is useful when there is a need to collect in-depth information in a systematic manner from a number of respondents or interviewees (e.g., teachers, community leaders). (Seidman, 1998).

According to the above, the semi-structured interviews are appropriate for this study because it gives the interviewer or researcher more freedom to explore his/her themes of interest with two key objectives: one, to explore and understand the interviewee's perception towards the research issue; secondly, to know whether the interviewee can confirm insights and the information the researcher already held (Newton, 2010). The aim of interviews was to explore the current situation of the use of ICT in the case studied schools in Saudi Arabia.

4.7.2. Trustworthiness, credibility, conformability and transferability measures of the interviews

In conducting the interviews, many procedures have been applied to promote the trustworthiness of its findings. The interview questions were piloted before conducting the actual interviews. All the questions and their length were tested by conducting three interviews with three of the targeted participants, before deciding on the final format in order to be sure that they were clear enough and covered all relevant aspects of the research topic.

In addition, piloting the interviews offered the opportunity to ensure the avoidance of leading questions, which can cause researcher bias. One of the headmasters, teachers and students were used to pilot the interviews. Based on their suggestions, some questions were re-drafted

(Gillham, 2000). Each interview lasted approximately an hour. The interview sessions were recorded on a tape recorder, and written notes were also collected. Hard and soft copies of the information collected were saved to prevent any loss of data or undue tampering (Gill et al. 2008).

The study has taken into account Hewson et al.'s (2003) suggestion to promote the credibility of the interviews, which included; providing the interviewees with information regarding the interviews beforehand (i.e. purpose, duration, consent, topics of interest) and asking for a convenient time for the interviewees. In compliance with Easterby-Smith et al.'s (2008) recommendations for reducing the interviewed bias, the researcher used well-defined themes in the interviews' schedules, which helped him to avoid asking leading questions and demonstrate a credible level of knowledge to the interviewees who already received a copy of the interview's themes beforehand, so they can prepare the required information and evidences to support them. Moreover, the use of propping questions and the avoidance of long or jargonistic questions were all taken into consideration.

Additionally, matters related to choosing a convenient time for the interviewees, duration of the interviews, the acceptable appearance of the interviewer, the adoption of a natural posture and the demonstration of interest were all taken into account as suggested by Robson (2002). In adherence to Ghauri and Grønhaug's (2005) recommendations, notes were taken during the interviews to summarize the responses and keep the interviewer's focus, and help checking notes with the interviewees after the interviews.

This, together with Yin's (2014) suggestion of comparing and contrasting between different cases (in this study; interviewees from different schools) promoted the credibility of the interview's findings. Moreover, Guba and Lincoln's (2001) recommendations were taken on board by adding contextual information to the interview's notes, which included (time, participant's information, sittings, location and impressions) to promote the dependability of the interview's findings.

Finally, measures of conformability and transferability suggested by Guba and Lincoln (2001) were taken into account. To ensure conformability, the interview findings were reviewed and discussed with two of the researcher's colleagues, which included: interpretation, reasons, evidences and other alternative explanations. On the other hand, the interviews results' transferability to the Saudi context. For more details see appendix 1a, b and c. (Measures to promote the trustworthiness of the interviews, before, during and after).

4.7.3. The Questionnaires

The questionnaire (survey) is the most powerful research tool used in the collection of both quantitative and qualitative data, and it consists of short questions formulated to suit the data needs within social science research, for gathering information on participant social characteristics, present and past behaviour, standards of behaviour or attitudes, and their beliefs and reasons for action with respect to the topic under investigation (DeVaus, 2002; Bulmer, 2004; Robson, 2002). Furthermore, the use of the survey provides an efficient way of gathering data from a large sample, with standardised questions to help the researcher to explain the phenomena and examine relationships between the variables (Gill &Johnson, 2002).

However, there are two main types of questionnaires that can be used in the collection of data. These include structured closed-ended and open ended questionnaires (Youngman, 1982). In structured closed-ended questionnaire, the researcher provides the participants with a proper list of responses (e.g. Yes / No, or agree/ not agree). This type of questionnaire is mainly related to quantitative data research. While, "Open question" or (open-ended) is a questionnaire where the participants are not provided with a set answers from which to choose. Rather, they are asked to answer "in their own words". This type of questionnaire is mainly related qualitative data. (Youngman, 1982).

Based on this, the study used a structured closed ended questionnaire with Likert scales in which the respondents were only required to provide a specific answer to the question asked. It doesn't give the respondents a chance to elaborate on the answer they have given, which was the case in this study (Williams, 2003; Dillman, 2007). In addition, Likert scale is usually used to gather responses without forcing participants to express positive or negative feelings towards the questionnaire (Dillman, 2007). The aim of conducting the questionnaire was to seek participants' views about a set of standardised questions comprising different items in different dimensions, related to the criteria of the implementation of ICT in Saudi secondary schools.

The questionnaire's findings were combined into those obtained from interviews data. Thus, the study was able to triangulate the results, not only by incorporating data from different techniques, but also from different sources (Literature review). This procedure according to Healy and Perry (2000) reflects obtaining enhanced and trustworthy results through examining the phenomena from the views of different levels of individuals.

However, the questionnaires' design is illustrated in the following section (for the original questionnaire see appendix 2a, b and c).

4.7.4. The questionnaire design

Questionnaires' statements have been categorised into eleven sections. Each section aims to achieve the set study objectives. The headmasters' and teachers' questionnaires are almost similar. However, the student questionnaire contains some differences compared to the headmaster and teacher's questionnaire; this because of the differences in positions and roles of participants. Each section contains a number of items/questions, all of which are answered on 5-points (Likert scales). The final form of the questionnaire consisted of the following sections.

- ***Section I – Profile & level of ICT training***

This section has been divided into five items; gender, age, years of experience, qualification, and ICT training level, which are suggested by several studies to have an effect on the participants' responses (Ghosh, 2011; Horvat et al. 2012; Rodriguez, 2011). The participants were asked to identify their ICT training level from advanced training level to no training.

Advanced	Good	Moderate	Poor	No Training

- ***Section II – Perceptions towards ICT and traditional teaching***

In this section, the participants were asked to provide responses reflecting their perception of aspects related to using ICT in education. For instance, the dominant perspective on ICT compared with traditional teaching, the motives or the inhibitor behind the use of ICT, and the influence of some factors in ICT implementation. The participants were asked to rate their agreement through 20 items; represented from strongly agree to strongly disagree.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

- ***Section III - Level of ICT skills (Qualification)***

This section provides a summary of the data collected from participants' responses reflecting their level of ICT skills, through 11 items; represented by level of ICT skills between advanced to no skills.

Advanced	Good	Moderate	Poor	No Skills

- ***Section IV - Current situation- ICT tools***

This section presents the reality of the current situation within the schools (availability and utilization of ICT tools). The participants were asked to rate their answers through 14 items, from available with use at all times to unavailable.

Available with use at all times	Available with frequent use	Available with limited use	Available with no use at all	Un-available

Section V -Level of ICT Training

This section aims to assess the level of participants' training, in ICT, to find out their qualification to use ICT and what type of training courses they need. The participants were asked to rate their ICT skills through 11 items, represented by skills between advanced to no training.

Advanced	Good	Moderate	Poor	No training

- ***Section VI -ICT in school functions***

This section provides a summary of the data collected from participants' responses reflecting their level of ICT implementation, through 13 items; represented level of implementation of ICT between always to never.

Always	Often	Sometimes	Rarely	Never

- ***Section VII –The level of satisfaction towards ICT implementation***

This section aims to understand the level of satisfaction between study participants in regards of availability and implementation of ICT tools in their schools. The participants were asked through 12 items for the headmasters, to rate their agreement from extremely satisfied to extremely dissatisfied.

Extremely Satisfied	Satisfied	Neither satisfied nor dissatisfied	Dissatisfied	Extremely Dissatisfied

- ***Section XI –Important factors for ICT implementation***

This section was designed based on the suggestions gathered from participants' views in qualitative data. The participants were asked through 11 items to rate the level of importance of success factors in ICT implementation, from very important to not important at all.

Very important	Important	Neither important or important	Not important	Not important at all

- ***Section VIII –The role towards ICT implementation***

This section provides information regarding the role the headmasters and teachers play in ICT implementation; the participants' responses reflect to what extent they block or facilitate the implementation of ICT. The participants were asked through 20 items for the headmasters and 16 items for the teachers, to rate their agreement from always to never.

Always	Often	Sometimes	Rarely	Never

- ***Section IX – Degree of understanding and applying ICT policy***

This section provides a summary of participants' responses, reflecting their opinion of aspects related to ICT policy. For a closer examination, it was necessary to know to what extent the participants are aware of the policy towards the implementation of ICT in education. This

helped to understand; if the objectives of the Ministry of Education are clear, and to what extent they are reflected on the ground. Through 13 items, the participants were asked to rate their agreement from strongly agree to strongly disagree.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

- ***Section X – Challenges***

In order to further explore, this section investigates the barriers and challenges in ICT implementation. The investigation in this section examines 28 items, external and internal barriers, which are identified in from the study framework and findings of qualitative data. The participants were asked to rate their agreement from strongly agree to strongly disagree.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

4.7.5. Validity and reliability measures of the questionnaires

To promote the validity of the questionnaires, the questions were structured in such a way that they were able to collect the desired information without leading a respondent to a certain answer (Paltridge & Starfield, 2007; Booth, et al. 2003). Moreover, Edwards et al.'s (2002) suggestions of ensuring the questions' clarity, logical flow, questionnaires' length (4-8 pages) and the introduction of new topics were taken into consideration.

Additionally, pilot questionnaires were distributed to 10 students, five teachers and five headmasters. Given the time limitation and recourses available, the aforementioned numbers of the pilot participants provided an adequate way to test the questionnaire suitability and clarity, so as to enhance the validity of the questionnaire and at the same time provide the researcher with the means to test the questionnaires' internal consistency to help assess its reliability. In piloting the questionnaires, participants were requested to add any comments regarding the items' clarity and suitability.

The questionnaire items were reviewed and discussed with two of the researcher's colleagues to assess their content validity. 13 items were changed and five items in the availability of ICT tools were deleted (e.g. Graphics/drawing packages, design Specialist programes e.g. maths or science) .The average time to fill out the students' questionnaire was 10 minutes, teachers' questionnaire was 13 minutes and headmasters' questionnaire was 14 minutes.

To promote the questionnaires' reliability, the questionnaires consisted of items that test the respondents' answers- whether they are expressing honest responses or just filling the questionnaires- by investigating the same issue in different items. Moreover, the questionnaires' internal consistency between items in each scale was tested using Cronbach's

alpha which showed acceptable levels of consistency according to Fink (2003). It tests the consistency between answers within the same questionnaire (ranging from 0% to 100%).

Overall, as can be seen in the questionnaires from teachers and headmasters as well as students, overall reliability is good, reflecting that each of the scales include items that have consistent answers with each other. Based on Field (2013), reliability near or above 0.70 is considered good and scales are hence reliable. See tables below.

Table 4.3: Cronbach's alpha reliability for teachers' and headmasters' questionnaires

Twelve main Scales	Number	Cronbach's alpha reliability
ICT training	11	0.918
Current situation (availability of ICT tools and use)	14	0.817
ICT skills	8	0.913
Teachers' ICT usage	13	0.887
Headmasters' ICT usage	13	0.796
Challenges	28	0.875
Views and attitude towards ICT	20	0.847
Teacher's role towards ICT	16	0.877
Headmaster's role towards ICT	20	0.887
ICT policy (view and understanding)	13	0.710
Satisfaction towards ICT	12	0.891
Importance ICT factors	11	0.892

Table 4.4: Cronbach's alpha reliability for students' questionnaires

Ten main Scales	Number	Cronbach's alpha reliability
ICT availability and use	12	0.708
ICT skills	4	0.866
ICT in school function	5	0.782
ICT challenges	15	0.808
View and attitude towards ICT	15	0.902
Headmasters' role towards ICT	9	0.827
ICT subject and ICT tools condition	16	0.701
Teacher's role towards ICT	16	0.732
Satisfaction	8	0.829
Importance ICT factors	8	0.848

4.7.6. Sampling

Sekaran & Bougie (2010, p.262) define research sample as; *'the entire group of people, events or things of interest that the researcher wishes to investigate'*. While the process of defining a representative population for the research is known as sampling, which aims to produce valid and credible sample data and statistics that match the precision needed for the study. It is used to avoid bias during the selection of sampling and also to get an equal representation of sample across the total population, in order to obtain correct information and results for the study. There are two main sampling categories: probability and non-probability sampling (Engel & Schutt, 2005).

A probability sample is a random selection, and each element within the population has an equal, or at least a known, probability of being selected within the sample. (Bryman and Bell, 2003). In addition, the main aim of using a probability sample is to reduce the sampling error and to keep it to a minimum. On the other hand, in order to have a random probability sample, certain procedures are used to ensure that the different units within the population have equal probabilities of being chosen. For example, simple random sampling, systematic random sampling, cluster random sampling, and stratified random sampling (Saunders et al. 2012).

Whereas, non-probability sampling holds some procedures that do not include random sampling at some phase in the process (Krathwohl, 1997). According to Saunders et al. (2012), non-probability samples can be classified into five types; convenience, quota, snowball, self-selection sample and purposive (judgmental) sampling.

In following section, sampling techniques, size and considerations to ensure the recruitment of a representative sample were discussed. Given that this study employs two data collection techniques, one of them quantitative and the other qualitative with different sampling techniques and considerations, this section is therefore divided into two sections pertinent to each data collection technique.

4.7.7. Sampling type, size, technique and consideration for the interviews

- **Sampling type**

Purposive or judgemental sampling was selected in this study for interviews. According to Saunders et al. (2012), this type of sampling enables the researcher to use his/her judgement to select cases that will best help to answer the research question(s) and to meet the study objectives. Furthermore, it is often used with very small samples such as in case study research (as the case in this research) and when the researcher wishes to select cases that are particularly informative. Bernard (2002) suggested that in selecting a purposive sample, the study should determine the sampling limitations and search for individuals willing and able to offer the required information from experience or knowledge. Therefore, individuals invited to participate were chosen from different institutions (schools and Ministry of Education) based on their backgrounds, responsibilities and qualifications, to be representative of the current situation of ICT in Saudi secondary schools.

- **Sampling size and technique**

As mentioned earlier, in the section of data collection methods, the study selected semi structured interviews. In addition, the study followed some tips, before, during and after conducting the interviews, which are presented in detail in appendix 1a, b and c.

How many - According to Patton (2002), in conducting semi structured interviews, the total number of the sample should be decided during the study. After each interview, a quick analysis was made in order to outline the major issues mentioned in the interview. If the collected data seems to not cover the desired level of dependability (reliability), a new case is selected in order to achieve a higher level of reliability and trustworthiness and to reach a saturation level. Following the guidelines by Yin (2014), until it is decided that the data obtained from the sample are rich enough to make a credible generalisation, the recruiting of more participants is highly advised.

Why that many - According to Glaser and Strauss (2009), sample size is deemed to be satisfactory only when the key concepts that have been identified from the collected data have reached saturation point.

Size and technique- The selected sample (n=14) included four headmasters, four teachers, four students in Jeddah secondary schools, and two ICT directors in the Ministry of Education. Regarding the ICT directors sample, the first was the director of ICT tools in the department of educational technology. The second was the Director of Information Centre in the Department of Computers.

The headmasters sample was chosen according to guidance from the Department of Education, and the availability of an adequate ICT infrastructure in their schools.
However, the classroom teachers were selected by their headmasters (in the selected schools), who are known to them as honest, more outspoken and critical towards the research issue as well as being competent users of ICT in their teaching. On the other hand, the student participants were chosen from the school's registration lists based on recommendations by their headmasters, who were identified by their readiness and willingness to answer questions related to the study topics.

The participants (except the students) were between 25 and 58 years of age; their education experience ranged from two to 19 years and they had zero to 12 years' experience of using ICT tools. They had bachelor's degree as their highest qualification, and half of them had received formal ICT training. However, only two of them had advanced levels in ICT. In general, each

participant was symbolised during the analysis process by giving him a code, (for more details see chapter five, table 5.1), which provides a summary of the participants' information.

4.7.8. Sampling type, size, technique and consideration for the questionnaire

- **Sampling type**

Regarding the questionnaire sampling technique, the study has selected quota sampling type, which is completely non-random and normally used for interview surveys. It is based on the principle that the research sample should represent the population, as the inconstancy in the research sample for various quota variables is the same as that in the population. (Barnett 2002).

According to Saunders et al. (2012), in selecting the quota sample the researcher should divide the population into specific groups, and calculate a quota for each group based on relevant and available data. In addition, quota sampling has a number of advantages over the probabilistic techniques. In particular, it is less costly and can be set up very quickly. In light of this, the quota sampling type has helped the study to recruit appropriate participants, taking into account that they have the desired population characteristics.

- **Sampling technique**

Questionnaires were distributed to 16 boys' schools and 16 girls' schools, in Jeddah secondary schools.

Size-The distribution in each school was as follows; one questionnaire for each headmaster, four questionnaires for teachers and four questionnaires for students. Accordingly, the number of questionnaires in each school was 9 questionnaires. The number of targeted schools was 32 schools. Therefore, the total target number was 288 participants. 273 questionnaires were returned, while 230 were valid. As such, a response rate of 81.8% was achieved, which is an acceptable response rate according to Saunders et al. (2012). (See table 4.5).

Participants	Male	Female	Distributed	Total Response			Response Rate
				Male	Female	Total	
Headmaster	16	16	32	14	14	28	87.5%
Teachers	64	64	128	50	50	100	78.1%
Students	64	64	128	50	52	102	79.6%
			288			230	81.8%

Table 4.5: Surveys Sample

- **School selection**

The study selected Jeddah city schools for several reasons. First, the customs and traditions of Saudi people do not vary from one area to another, where the Islamic religion shape the attitudes and behaviors of the Saudis in general. Second, the researcher had worked previously as a teacher and headmaster in different schools in Jeddah city, and this gave him an opportunity to know about the existing ICT issues within the schools. In addition, the personal relationships between the researcher and some officials have contributed to facilitating the task of the researcher in many schools, especially access to the places and information not readily available to the others researchers (see photos to the warehouses and attending some workshops in schools in chapter 5). Third, according to the General Administration of Education in Jeddah (2016), all public secondary schools (Boys and Girls) in Saudi Arabia are provided with almost the same ICT facilities and services.

However, Jeddah schools are classified into four learning areas, named 'Education Offices', in the north, east, south and middle of Jeddah city (General Administration of Education in Jeddah, 2016). Hence, eight schools have been selected from each area (four schools for boys and four for girls) to represent the current situation of ICT implementation. See Table 4.6. From all the above factors, it can be said that the city of Jeddah could present the sample of the study, which can be generalized to all secondary schools in Saudi Arabia.

North Area		East Area		South Area		Middle Area	
4 Girls schools	**4 Boys schools**	**4 Girls schools**	**4 Boys schools**	**4 Girls schools**	**4 Boys schools**	**4 Girls schools**	**4 Boys schools**
One Survey for each Headmaster	One Survey for each Headmaster	One Survey for each Headmaster	One Survey for each Headmaster	One Survey for each Headmaster	One Survey for each Headmaster	One Survey for each Headmaster	One Survey for each Headmaster
Four Survey for each teacher	Four Survey for each teacher	Four Survey for each teacher	Four Survey for each teacher	Four Survey for each teacher	Four Survey for each teacher	Four Survey for each teacher	Four Survey for each teacher
Four Survey for each student	Four Survey for each Student	Four Survey for each student	Four Survey for each student	Four Survey for each Student	Four Survey for each student	Four Survey for each student	Four Survey for each student

Table 4.6: Schools selection technique for questionnaires

4.7.9. Data Analysis Procedures

In this section, the study analysis procedures and considerations to ensure the trustworthiness (of the qualitative study findings) and the validity and reliability (of the quantitative study findings) are discussed. Given that this study uses two data collection techniques (qualitative and quantitative) with different analysis procedures associated with each one of them, this section is therefore divided into two sections pertinent to each data collection technique.

- **The interviews' qualitative data Analysis Procedures**

According to Yin (2014) one of the most useful techniques for analysing a case study is ***'pattern matching logic'***. According to Trochim (1989), this logic, *"Compares an empirically based pattern – that is, one based on the findings from your case study—with a predicated one made before you collected your data (or with several alternative predications). If the empirical and predicated patterns appear to be similar, the result can help the case study to strengthen its internal validity"* (cited in Yen, 2014, p. 143). As this study is an explanatory and descriptive study, according to Yen (2014), the pattern matching technique is still relevant here, as long as the predicted patterns have been well defined before the data collection.

In order to identify, analyse and report patterns within the data (interview), the study used the **'Thematic Analysis Method'**. This method, in the words of Braun & Clarke (2006), helps the researcher in identifying, analysing and reporting patterns within the data. Therefore, the study selected this method, which suggests six stages (each based on the previous one) that should be followed by the researcher to attain the objective of qualitative data analysis (Braun & Clarke, 2006). (See figure 4.6). Furthermore, this method should help to focus on the relevant parts of the data and reduce them into manageable summaries (Namey et al. 2007).

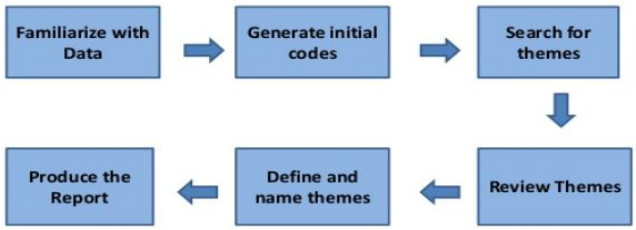


Figure 4.6: Phases of Thematic Analysis (Braun & Clarke, 2006)

Accordingly, the interview texts were transcribed and then read several times with the aim of becoming deeply immersed in the data. All the codes have been classified under two main themes and seven sub-themes, which have also already been identified in the study's theoretical framework. After reviewing the initial codes repeatedly, it became clear that there was a repetition of ideas. Therefore, the codes have been reduced to be related to the study questions and objectives. All codes, themes and sub-themes have then been reviewed in order to make sure they relate back to the same relevant content.

Many qualitative software programs are available to aid with qualitative research. Also known as Computer-assisted qualitative data analysis software (CAQDAS). These types of software are helpful to assist with coding, transcription and analysis. Moreover, they can be used with any type of non-numerical data (i.e., focus groups, interviews, videos, images, etc.) Research

that is otherwise difficult to carry out due to vast sample sizes, complicated analysis and research teams with many members can be completed with these software programs. The most popular qualitative software are, ATLAS.ti, Dedoose, MAXQDA, and NVivo. The study used Nvivo software package, as oppose to the other software programs designed to assist the analysis of data for many reasons. Nvivo software helped in the coding and categorisation as well as retrieval of data in more organisable and manageable ways (Welsh, 2002).

Nvivo is free for students at the university and there were many training programes to help them to use it. Furthermore, NVivo has an interface similar to Microsoft making it user-friendly. Also, it is easy to access from any mobile device including an iPad, iPhone, and Android phone. Finally it supports multiple file types (University of Surrey. 2011).

Below is an example of the classification of the two main themes and the seven sub-themes by using Nvivo software.

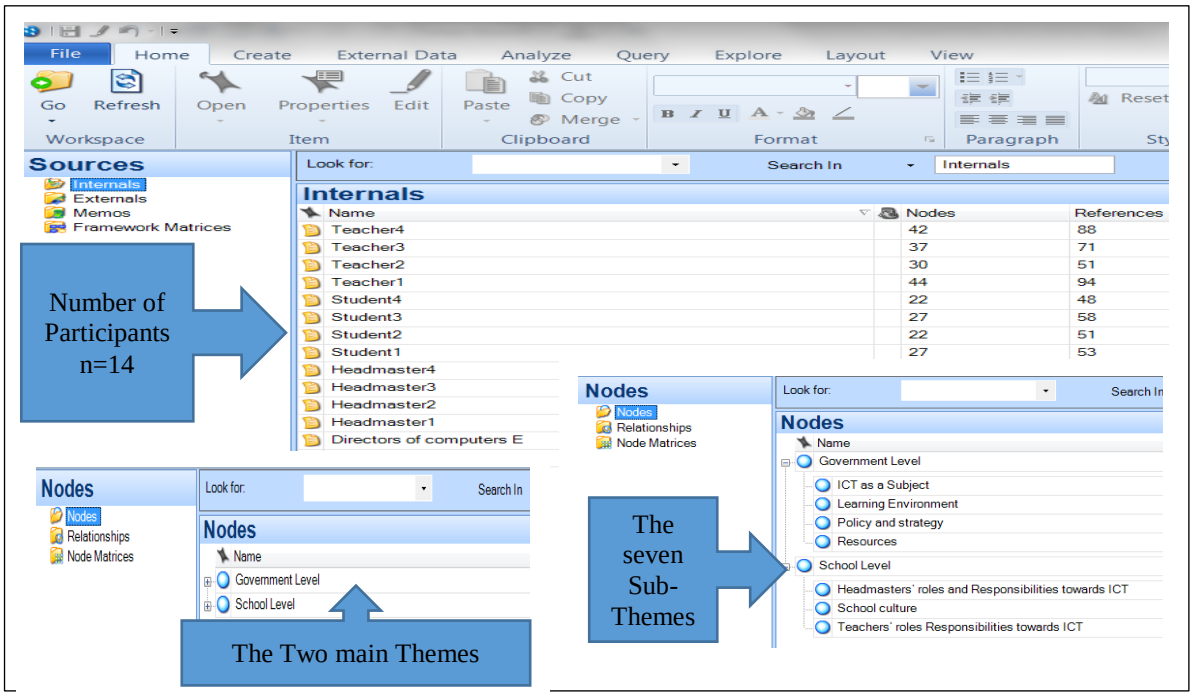


Figure 4.7: Analysing quantitative data (Nvivo software)

In addition, before proceeding with inferential statistics, each of the main scales for headmasters, teachers and students were averaged (after re-coding negative questions and unifying the scales' direction). Due to the similarities between headmasters and teachers' questionnaires they were combined, also for the reason that there is a low number of headmasters (28) who participated in this study.

Regarding the data type, before commencing with inferential statistics, it was essential to determine whether the data is considered 'Parametric' or 'Non-parametric'; this consideration

will enable the selection of the suitable inferential statistics for the current data. The data is considered parametric if it is considered of an interval scale and satisfies normal distribution; failure in satisfying both conditions leads to the assumption of the data being considered non-parametric (Field, 2013).

In this case, the study used Parametric Tests, as this data is considered parametric, hence this study will employ suitable inferential statistics that aim to provide inferences from the current data to the bigger population (Field, 2013).

A number of tests have been used as listed below and for more details see chapter 6.

- Pearson's r correlation coefficient
- Independent samples t-test
- One way analysis of variance (ANOVA)

4.7.10. Triangulation

As noted earlier, a research project can implement either qualitative or quantitative methods, or a mixed (triangulated) method. Triangulation is therefore defined as the use of a combination of methods to study the same phenomenon (Hussein, 2009). Denzin, (1970) classified the triangulation in social research into four types. (See Table.4.7).

The logic of using triangulation is based on the principle that no single method ever adequately solves the problem of rival explanations (Patton, 2002). This is because each method reveals different aspects of empirical reality, and no method is superior to the other (Walker, 2005).

Types of Triangulation	Occur when;
Data Triangulation	Data is collected in different contexts and settings at different times
Investigator/ research Triangulation	More than one researcher investigates and may have different knowledge and experience on the same situation
Theory Triangulation	A number of different or competing theories are used whilst examining data
Methodological Triangulation	Involves the use of multiple methods in data collection, analysis within or across the issues in an attempt to decrease the weakness and biases of each method and increase validity by reducing the weakness of one method with the strength of the other method. For example, involves the use of multiple qualitative and/or quantitative methods to study the ICT implementation in education

Table 4.7: Types of triangulation and when can occur (Denzin, 1970)

This study has utilised two of the Denzin's (1970) types of triangulations, namely data and methodological triangulations. Data triangulation was applied in this study where data is collected from different settings/contexts (schools and Ministry of Education). Methodological

triangulation on the other hand was applied in this study by the triangulating evidences from two data collection techniques (interviews and survey).

Here, methodological triangulation according to Saunders et al. (2012) has different purposes. Two of those purposes were facilitation and evidence triangulation. Facilitation occurs when one data collection technique or strategy is aided by another data collection technique or strategy. In this study, the outcome of the interviews has aided the building of the questionnaires. This is to say that evidences collected from the interviews have helped to construct the questionnaires' items.

Triangulation according to Saunders et al. (2012) occurs when evidence from more than one data collection technique are corroborated to promote the trustworthiness of the study findings. In this study, the triangulation occurred when the study strived to accumulate and corroborate findings from the interview and the questionnaire to enhance the collected evidences and produce trustworthy conclusions/solutions (See chapter 7 and 8).

It is worth mentioning that given that the study has used a mixed methods design, many authors have addressed the order by which the data collection techniques can be conducted in triangulation (Caracelli and Greene, 1997; Creswell and Plano Clark 2007; Tashakkori and Teddlie, 2003; Mertens 2005). They all agreed on two approaches with insignificant differences of types of order categorised under each approach. These approaches are parallel approach and sequential approach. Parallel approach means that more than one data collection technique is used in the study, and each data collection technique is conducted separately and independent of the other data collection techniques, then eventually results are triangulated. In the sequential case data collection techniques are related and one data collection technique aids another data collection technique.

In the latter case, data collection techniques cannot be conducted independently and one data collection technique's results affects another. This is the case in this study; the study used the mixed method design in its sequential form, and results from the interviews informed the construction of the questionnaire's items.

Therefore, the questionnaire as a data collection technique is dependent on the interview. A summary of the study techniques, purpose and source of data in relation to the study objectives is demonstrated in the table (4.8) below.

Table 4.8: A Summary of the study techniques, purpose and source of data in relation to its objectives

Technique	Purpose	Data source	Relation to the study objectives
Interviews	Obtain detailed information	**ICT Directors**	•To examine the role and responsibilities of the Ministry of Education towards ICT • To define factors that affect ICT implementation (negatively/positively) in Saudi secondary schools
		Headmaster	•To examine the role and responsibilities of the school headmaster towards ICT • To define factors that affect ICT implementation (negatively/positively) in Saudi secondary schools
		Teachers	•To examine the role and responsibilities of the school teachers towards ICT • To define factors that affect ICT implementation (negatively/positively) in Saudi secondary schools
		Students	• To examine the current situation of Saudi secondary schools from the students' perspectives •To define factors that affect ICT implementation (negatively/positively) in Saudi secondary schools
Headmaster's survey	Obtain data from a large sample	**Headmaster**	•To examine the role and responsibilities of the school headmaster towards ICT • To define factors that affect ICT implementation (negatively/positively)in Saudi secondary schools
Teachers' survey	Obtain data from a large sample	**Teachers**	• To examine the implementation of ICT tools from the teachers' perspectives. • To define factors that affect ICT implementation (negatively/positively)in Saudi secondary schools
Students' survey	Obtain data from a large sample	**Students**	•To examine the current situation of Saudi secondary schools from the students' perspectives •To define factors that affect ICT implementation (negatively/positively) in Saudi secondary schools

4.8. CONCLOUSION

The study reflects the interpretivists' philosophy that places more emphasis on the development of knowledge that is socially constructed. Driven by the notion that humans' actions (Phenomenology) are determined by their own choices, perceptions and ability to control them (Sexton, 2003), the adoption of the subjectivism ontological stance is part and parcel of this study as it tends to understand the phenomena (the implementation of ICT implementation in Saudi secondary schools) through the meaning that participants attach (perspectives) to the phenomena under investigation. Given the wealth of literature that is related to the implementation of effective ICT globally, this study has mainly adopted an abductive approach to formulate its research question and objectives.

To conclude, the study approach that aims to develop a strategic approach for ICT implementation in Saudi secondary schools can be fulfilled by the utilisation of a case study strategy that gathers evidence from multiple resources, techniques and individuals. This ought

to provide a comprehensive view of the current situation of ICT implementation in Saudi schools, and help detect challenges faces such as implementation. Accordingly, this chapter has contributed to the achievement of the study purpose, which aimed to select valid methodology to examine the ICT implementation in Saudi Arabia, using secondary schools as a case study. A summary of the study methodology (philosophy, approach strategies, choice, time horizons and techniques and procedures) are presented in the figure below.

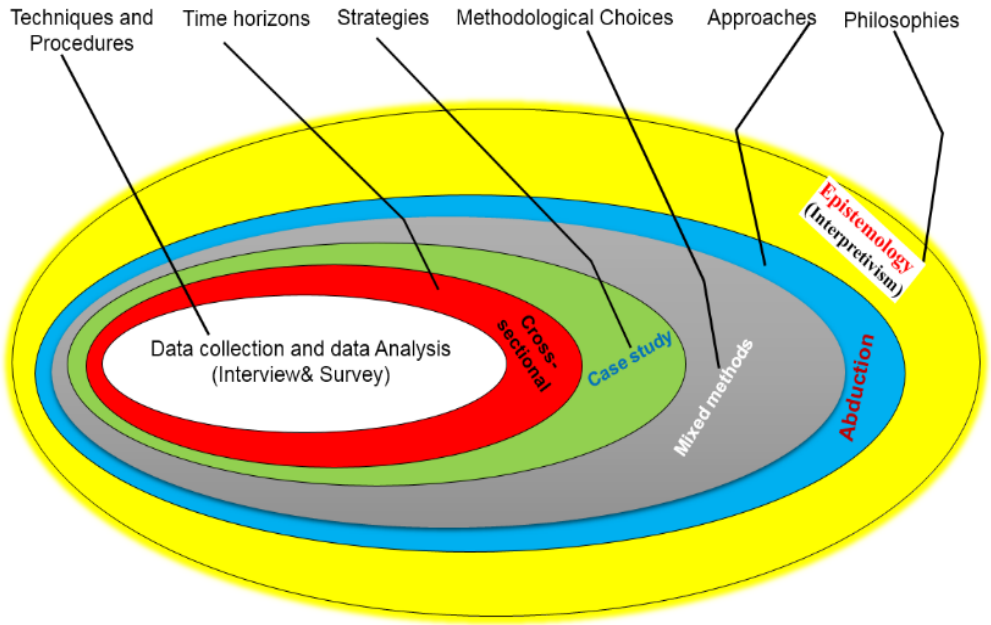


Figure 4.8: Summary of the study Research Methodology

In the next two chapters, the results and analyses of the employed data collection techniques are addressed to fulfil the study's third and fourth objective of the current ICT implementation in Saudi secondary schools, guided by criteria that are defined in the study's conceptual framework in order to identify the factors that might facilitate or hinder the application of ICT tools in general, and in Saudi secondary schools in particular.

CHAPTER V

QUALITATIVE ANALYSIS AND RESULTS

5. INTRODUCTION

This chapter aims to provide the results of qualitative data collected from participants in some secondary Saudi schools to evaluate the current situation of ICT implementation as well as presenting the most important factors (internal and external) that effect on its implementation, that have been derived from the study conceptual framework, (section 2.6), which in turn grew out of the study literature reviews. Therefore, and based on the classification of this framework, the qualitative data analysis results will be presented under three main themes, seven sub-themes and 21 criteria.

- **School Level**, which has three sub-themes; school culture, headmaster's role and responsibility towards ICT and teacher's role and responsibility towards ICT.
- **Government Level**, which has four sub-themes; policy and strategy, ICT as a subject, ICT resources and learning environment.
- **Challenges.**

All main themes and sub-themes with all criteria, will be analysed respectively, except the challenges theme, which will be analysed at the last of this chapter. This because, during the presentation of the results of the first and second theme, a number of factors and challenges are began to emerge, therefore, the study chooses to discuss them separately in the last section of this chapter.

This chapter also provides short description of method of collection qualitative data and its analysis. In addition, and based on the study framework, the overall study findings are presented in a comparison table in order to demonstrate the extent of agreement between evidence from the different data sources, which comprise both qualitative and quantitative data collection techniques (See chapter 7. Table 7.10, section 7.2).

Finally, at the end of this chapter, the conclusions drawn from the case studies are summarised, and the main findings are presented. The following section provides a short summary of the data collection techniques.

5.1. Qualitative Data Collection Techniques & method

The study used semi-structured interviews and purposive sampling technique with a combination of four headmasters, four teachers and four students in four secondary schools in Jeddah city, and two ICT directors in the Ministry of Education, (*n=14*). The interview

questions were piloted before conducting the actual interviews. Piloting the interviews offered the opportunity to ensure the avoidance of leading questions, which can cause researcher bias. Headmaster [1], Teacher [3] and student [4] were used to pilot the interviews. Based on their suggestions, some questions were re-drafted (Gillham, 2000).

All the questions and their length were tested many times before deciding on the final format in order to be sure that they were clear enough and covered all relevant aspects of the research topic. Each interview lasted approximately an hour. The interview sessions were written (notes). All the collected information were saved to prevent any loss of data or undue tampering (Gill, 2008). (For more details for conducting the interview, see Appendix 1a, b and c and the interviews questions in appendix 3).

The following section describes the design of the interview questions, which included three sections as following.

5.1.2. Interview questions design

- ***Section I – The Current Situation within the School Level***

In this section of the interview, it was felt important to examine the participants' views and attitudes towards ICT integration in education, as these are the people who are responsible for enacting any changes at schools (Shirvani, 2014). Consequently, scrutiny of the current situation regarding the usage of ICT tools in Saudi secondary schools (their availability and implementation) and the degree of participant satisfaction could help to determine which factors might affect ICT implementation (Attar & Sweiss, 2010).

In addition, determining the roles that the headmasters and teachers are practising to integrate ICT tools in education was also considered to be crucial (Charalambous et al. 2011). This could be achieved if the questions asked identified the degree to which they comply practically with the tenets of the Saudi ICT education policy, and to what extent they are professionally qualified to apply ICT in schools (Oyaid, 2009). See interview questions in appendix 3a, b, c and d.

- ***Section II – Government Level***

Exploring the government role played in the implementation of ICT in Saudi schools was also essential (Almalki & Williams, 2012). Many questions were asked in relation to education policy, the ICT as a subject, providing adequate and varied types of resources, and creating an attractive learning environment, with the goal of understanding whether there are any defined success criteria for this.

- ***Section III – Challenges Affecting the Implementation of ICT***

Exploring the two previous sections (the current situation at the school level and the government's level) could help to identify the challenges that might hinder the use of ICT, and the factors that could make the implementation of ICT more successful in Saudi secondary schools, which is considered to be the aim of this study.

Therefore, all participants were asked to identify whether the implementation of ICT tools is faced by any challenges that could prevent them from reaping the full benefit. In addition, to further understand the factors affecting the success of implementation, the most and least successful ICT implementations in the schools were investigated, alongside any other success variants and reasons for failure.

5.2. RESULTS

In this section, the results will be presented in a mixed manner among all participants. For example, each response or idea that could help to support or to answer the interview questions will merge with different points of view in the same context. Furthermore, the results of this chapter will be displayed as they are, without discussion, and they will be discussed with the results of the quantitative data in the separate chapter, (Chapter 7, discussion).

5.2.1. Sample profile

The participants were between 25 and 58 years of age (except the students), their education experience ranged from two to19 years and they had zero to12 years' experience of using ICT tools. All the participants (except the students) had bachelor degrees as their highest qualification. Half of the participants (five out of 10, except the students) had received formal ICT training.

However, only two of the participants had advanced levels in ICT. All the participants had computers and access to the internet at home, except for one teacher. This will be discussed further in a later section. Table 5.1 below shows a summary of this section. It is worth mentioning that each participant was symbolised during the analysis process by giving him a code. For example, Head teacher: **H**[1], [2], [3] and [4], Teachers: **T**[1], [2], [3] and [4], Students: **S**[1], [2], [3] and [4] , ICT Director: **D**[1] and Computer Director: **D**[2]. See table 5.1 below.

Table 5.1: Sample information in qualitative phase

Code	Participants Position	Gender	Age	Experience In education	Training In ICT	Qualification	ICT Skills Level
H[1]	Headmaster 1	Male	43	19 years	Formal Training	Bachelor	Intermediate
H[2]	Headmaster 2	Male	38	13 years	Formal Training	Bachelor	Expert
H[3]	Headmaster 3	Male	39	14 years	Self-Training	Bachelor	Intermediate
H[4]	Headmaster 4	Male	58	33 years	No Training	Bachelor	Poor
T[1]	Teacher 1	Male	25	2 years	Self-Training	Bachelor	Poor
T[2]	Teacher 2	Male	33	8 years	Self-Training	Bachelor	Intermediate
T[3]	Teacher 3	Male	46	21 years	Formal Training	Bachelor	Intermediate
T[4]	Teacher 4	Male	28	4 years	Self-Training	Bachelor	Expert
S[1]	Student 1	Male	17	----------	No Training	High School	Intermediate
S[2]	Student 2	Male	17	----------	No Training	High School	Intermediate
S[3]	Student 3	Male	18	----------	No Training	High School	Expert
S[4]	Student 4	Male	17	----------	No Training	High School	Expert
D[1]	ICT Director	Male	56	23 years	Formal Training	Bachelor	Expert
D[2]	Computer Director	Male	43	18 years	Formal Training	Bachelor	Expert

5.2.2. The School Level

1) School culture

Two questions were asked to explore the school culture, in order to establish the participants' views regarding three criteria (see table below). Exploring the views and perceptions of people regarding the research issue gives genuine insight into the reality of the case under investigation (Nicholas, 2011). Therefore, it was necessary to explore participants' views about the introduction and importance of ICT in education, since their perceptions affect their performance in the classroom (Bingimlas, 2009).

Theme	Sub-themes	Criteria	Research Enquiries	Target
School Level **Internal Factors**	**(1) School culture**	❖ Views and attitudes towards ICT integration in education ❖ Religion, culture and beliefs ❖ Satisfaction with current situation	✚ What are the views and attitudes of ICT stakeholders towards ICT implementation in Saudi secondary schools? ✚ To what extent do religion and beliefs play a role in ICT implementation? ✚ What is the level of stakeholder satisfaction with ICT implementation in Saudi secondary schools?	**Headmasters** **Teachers** **Students**

a) Views and attitudes towards integrating ICT tools in education

The results show that the majority of participants have positive views towards integrating ICT in education confirming that, for example, *"ICT makes the work easier, teaching more*

enjoyable, changes the daily routine, enhances student achievement, and, s*aves time and a great deal of effort for teachers as well as students",* which was reported respectively by **H[1]** , **H[3] , T[2]** , **D[1]** and **D[2].**

These views are supported by **T[1]**, when he stressed the pressing need for ICT in education, and the positive influence that ICT tools can have on learning and the teaching process for both teachers and students. He commented, *"ICT has become an urgent necessity in education these days, and it can make a huge difference for both students and teachers. This is a technological era; I mean nobody can deny the importance of using ICT in teaching".*

Both headmasters and teachers agree that students should not be deprived of learning through technology, and that they should be supported to become more involved in ICT. This is well illustrated by **H[3],** *"We must not deprive students of learning through technology; in fact, we should ensure that they are involved in this area. The use of educational technology has become a reality that cannot be ignored, especially at the present time."*

S [2] affirms how the presence and use of ICT is simply an everyday normality in daily life, and education should be part of this, saying, *"Nowadays educational technology is everywhere, in schools, at home, the market, and even on planes. Modern education is based on the use of ICT tools."* **S [3]** stated that, *"I find ICT in my school interesting. I learn best when my teachers use ICT tools rather than traditional teaching. I think ICT tools play an important part in the learning process."*

The use of ICT in the classroom by teachers is also highly respected. Students especially admire teachers who are competent in ICT skills and particularly those who are able to employ them effectively in the classroom. **S[1]** summarised these points of view succinctly, *"I respect teachers who use ICT tools in their lessons, and I feel they do their job well, because they are keen to make our lessons more interesting. I am very concerned about teachers who are not able to use educational technologies and so neglect them; to be honest, I don't respect them, and unfortunately, there are many such teachers in my school."*

Using ICT in lessons has had a significant impact on teaching technical subjects, specifically those requiring more practical lessons such as chemistry. Successful application of ICT in such subjects, including mathematics, is viewed as a breakthrough in accessing critical information, resources, demonstrations and also the media, via websites such as YouTube and its documentaries, which minimise the need for a physical lab. Illustrating this, **H[4]** explained, "*Teachers are now able to clarify and explain these experiments through ICT*

tools, for example, by watching documentary films on YouTube, without having to take risks and carry out dangerous experiments in the lab."

ICT has modernised teaching, and **T[3]** recognises that after 20 years in the profession, much has changed, *"The change between the past and the present is amazing in regard to teaching methods, especially in the use of educational technologies."* This change is also identified by **T[4]**, who noted that we are nowhere near the endpoint of educational technology, *"Day by day, the school environment is dramatically changing with the revolution of ICT tools."*

Although there were positive views about the importance of ICT in education, there was a contradiction between these views and participants' attitudes to the actual implementation of ICT. For instance, most participants did not agree that applying ICT was their own individual responsibility; some believed that it is the responsibility of, for example, the headmaster, and others, the Ministry of Education. This was observed when we asked **S[2]** about one of his teachers' attitudes towards ICT. He expressed his displeasure, *"We spoke with one of our teachers about our requirement to learn through ICT tools and the lack of using these tools in our school. He [the teacher] said that this was not his responsibility, it was the responsibility of the Ministry of Education and the headmaster."*

An additional issue was seen when teachers insist on using traditional methods of teaching, which was brought to our attention by the comments of **H[2]**. He said, *"Some of the older teachers, who are approaching retirement, prefer traditional teaching rather than using ICT tools"*. **H[2]** was also surprised when one of his teachers said, *"Using ICT is just a waste of time."* Such attitudes could be explained by a neglect or lack of interest in ICT, or possibly due to a lack of understanding of the education policy, or other reasons, such as, shortcomings in raising teacher awareness about the benefits of these tools in education or insufficient collaboration. This lack of interest could lead to structural problems, with roles and responsibilities being shifted and not assigned to the right individuals, resulting in individuals being unwilling to take on board the responsibility of applying ICT in schools.

The perception that ICT management is *'not my responsibility'* also affects attitudes and apparent inaction when ICT tools are not working properly, or there is a failure to take advantage of the usefulness of the computer labs. Related to the difficulty in engaging teachers to use ICT, **S[4]** referred to one of his teacher's comments. *"Please don't blame me, I'd like to use ICT tools, I'd like to give you all the facilities and support that you need, but it's not actually my responsibility to provide ICT, it has to come from the top."*

Of course, the teaching staff are only one small part of any school community; some negative attitudes from students were also identified in the study, leading to actions being taken, which expressed dismay with the school itself or against certain teachers. Students' attitudes can also restrict the learning process, due to a lack of interest and even boredom, which in turn can have a negative effect on ICT. In this context, **D [2]** confirmed, *"Some students deliberately disable or vandalise devices. Sometimes they even steal pieces of hardware or put something inside the CD drive to disable the device, and the reason, in my view, is that sometimes students want to express their anger or dissatisfaction with the school or with some teachers, by committing such acts of vandalism."*

Although there were positive views about the importance of ICT in education, it can be clearly seen that there are compelling differences in the opinions of the various parties concerning the responsibilities in ICT implementation. Thus, instead of cooperating together and sharing responsibility towards a shared vision of the successful implementation of ICT, instead they assign blame onto each other. As a result, an investigation into the specific roles of headmasters, teachers and the director of ICT is paramount, which will therefore be discussed in a later section.

b) Views towards Traditional Teaching

The results found that the majority of participants stressed the necessity of replacing traditional teaching methods, which some regard as old fashioned, with e-learning methods. For example, the consecutive statements from **T[2] ,T[3], H[4]** , **S[1], S[3]** and **D[1]** give short excerpts from their opinions about traditional teaching, *"I feel my students are also interested in changing the routine of traditional teaching; they like to learn by these technologies". "I used to follow the traditional way a long time ago, but I found using ICT tools is much better". "Traditional education has become ineffective". "Educational policy emphasises that traditional education is outdated". "I learn best when my teachers use ICT tools rather than traditional teaching". "Traditional teaching should be abolished".*

T[1] believes that such modern methods not only benefit the students, but also allow him to be more positive about his job: *"Using ICT tools in the classroom creates a kind of attraction and stimulation, which might allow the students to participate in the preparation of some lessons. This was not possible for me in the past, but now the student can take a leading role in the lesson by identifying the main ideas, and sometimes he can explain the lesson by himself. I do most of my teaching by computer and during the time I use the computer, I feel the lessons are far more interesting"*.

A similar view was shared by **D[2]** who regards traditional teaching and the use of pens and blackboard as something of the past and subsequently considers it necessary for teachers to adapt to the world around them, *"Traditional teaching methods are outdated and were only essential by virtue of the age we lived in. The chalk and blackboard method is not as useful with today's generation. Today's youth loves technology, making it necessary to keep up with the time we live in."* **H[1]** added a similar point by saying that *"traditional educational methods are considered as a reason for students' (as well as teachers') dislike of school."*

In addition, the participants agree that the change brought about by ICT is not simply limited to internal interaction and learning (in school) but can also improve communication with the external world in numerous ways. Hence, it is crucial that ICT is adopted and at least used at a minimum, while urging teachers to reflect on their mental attitude towards traditional teaching, and ensuring that learning is made more attractive to learners. **H[3]** stated, *"we should be able to use computers, at least, at a minimum - like searching on the internet for information and its available tools, we need to change our way of thinking and philosophy regarding traditional education, especially about how to achieve good learning outputs by using ICT to improve the environment of education and learning".*

However, the view that the greater use of ICT is inherently better was not shared by all participants. For example, **S[4]** expressed his preference for traditional teaching methods, recognising that this is not a mainstream view, *"Don't be shocked, but I prefer traditional teaching, because hardly any of my teachers cares about using ICT, even though it's available in my school. Only a few teachers use it, and if they try to use technology, I get really bored, because they don't have the necessary skills".*

This point is clearly of interest, as it is linked with the study issue, which has been identified as 'In spite of increased spending and Saudi governmental support for ICT in education, the progression has often been disappointing. Initially this could be due to the lack of ICT skills and motivation, or related to the lack of support and supervision. Compounding the situation is the fact that even students, who we usually expect to be proficient in and supportive of technology in the classroom, are sometimes doubtful about the current usefulness of ICT in Saudi schools. All of these issues will be discussed in the challenges section.

c) Degree of Satisfaction towards the current situation

In this section, the study aims to understand the level of participant satisfaction with ICT availability and implementation in the individual organisation (school level). As explained previously, the degree of satisfaction among school staff could give an indication about the

current situation. For instance, a high level of satisfaction could indicate a successful ICT implementation and vice versa (Attar & Sweiss, 2010). However, the study found a very low level of satisfaction, with 100% of the participants feeling that there is still a clear gap between the current situation (the reality) and their expectations. The participants identified several issues that they are dissatisfied with, as discussed below.

Regarding the satisfaction about the availability and use of ICT tools in school, for example, **D[1]** explained, *"We give our schools titles such as 'School of the Future' or 'Smart School,' yet they don't have even the minimum basic conditions required to use ICT tools. Frankly, the current situation is frustrating."*

Regarding the collaboration in ICT between schools and the Ministry of Education, there was also a lack of satisfaction with the uneven distribution of ICT tools, in terms of both quality and quantity, a factor which also affected the perceptions and levels of satisfaction. Furthermore, the Ministry of Education dealt differently with requests across schools, in some cases not being consistent in their responses, and there was some indication from the headmasters of corruption in transactions, resulting in disappointing outcomes for some schools. **H[1]** reported, *"The way that the Ministry of Education deals with requests seems to be different for each school, not every school is treated the same way. It's not fair on the teachers, expecting them to work in an environment like this with a lack of proper facilities"*.

Expressing their dissatisfaction, three-quarters of headmasters called for change in order to improve the school infrastructure, training, ICT maintenance and the provision of more ICT resources, with other frustrations reported, such as slow internet connection speeds, and ineffective collaboration between staff and students. Therefore, they see the integration of ICT in all school areas as still being far below expectations.

H[2] gave some specific reasons why he is not content with the current situation, *"I'm not at all satisfied with the support and supervision coming from the Ministry of Education, and also the attitude of some teachers and students towards ICT tools and the collaboration in ICT implementation (between staff)"*. **H[1]** went even further, expressing pessimism about the future, *"If the current situation continues, I think it will be a dark future. Believe me, I can't see any possible progress in this issue."* Most students believed they do not receive the full benefits from the ICT tools at school, with **S[2]** commenting, *"I get really annoyed with these devices, because they don't help me in any way at all."* This inadequate interaction of teachers with ICT and its application in the classroom is an issue of deep concern for many

students, and it is clear that the quality of resources and the learning environment also need substantial improvement. As **S[4]** asserted , *"The school environment does not help in learning and teaching. This is obvious, and cannot be ignored."*

Teachers however, identified that these limitations were due to a lack of ICT tools, resulting in an inadequate ICT environment, insufficient training as well as limited support from the administration and the Ministry of Education. Most participants (**D[1], D[2], H[1], H[2], H[4], T[2]**and **T[4]**) stressed that intervention from the Ministry of Education is essential at the school level, and that all ICT users in school should have a clear role to play.

Regarding the education policy, the study found low satisfaction with the current ICT policy. However, the study will subsequently presents the key findings on current ICT policies and strategies. The following table summarises the participants' degree of satisfaction with all previous issues.

Table 5.2 Participants' degree of satisfaction about ICT in school

Issues participants are dissatisfied with	Dissatisfied	Interviewees
The current situation regarding availability and use of ICT	11 (*n*=14)	All
Support and supervision from the Ministry of Education	8 (*n*=10)	All, except students
Outcomes of using ICT tools in education	7 (*n*=14)	All
The attitude of some students towards ICT	7 (*n*=14)	All
The quality of ICT devices	9 (*n*=14)	All
Training in ICT	9 (*n*=10)	All, except students
Development of the integration of ICT tools in schools	10 (*n*=14)	All
Teachers' ICT skills	12 (*n*=14)	All
Headmasters' role in ICT implementation	9 (*n*=14)	All
Teachers' role in ICT implementation	10 (*n*=14)	All
ICT policy (objectives and clarity)	7 (*n*=10)	All, except students
Collaboration between staff and the Ministry of Education	8 (*n*=10)	All, except students
The internet service in schools	12 (*n*=14)	All

2) Headmasters' Roles and Responsibilities in ICT

This sub-theme is also related to the main theme (School Level). Two questions were asked regarding the role of headmasters and their responsibilities towards ICT implementation, which can be assessed by three criteria (see table below).

Theme	Sub-themes	Criteria	Research Enquiries	Target
School Level Internal Factors	**(2) Headmaster's role & responsibilities in ICT**	❖ Creating an attractive school environment (Using ICT, supportive, encouraging, collaborative and facilitative) ❖ Controlling, monitoring and assessing ICT usage	✚What role should the headmaster play in facilitating ICT implementation in Saudi secondary schools? ✚What ICT applications are used in headmaster functions?	**ALL**

a) Employing ICT tools in school daily tasks

Regarding the employment of ICT tools for educational purposes, the 'Al-Noor program[1]' was widely used by 100% of the headmasters in their daily tasks. This programme provides assistance with administrative, as well as communication issues, both within and outside the school. Some headmasters had fully embraced ICT, while others used it only as and when required, but mainly solely for administrative duties. Commenting on his employment of ICT tools, **H[3]** emphasised, *"Almost 80% of my work is accomplished electronically. I use ICT tools in the preparation of daily reports. I also use ICT to communicate with the Ministry of Education and sometimes I even communicate electronically with the students' parents"*. Commenting on the value of this programme, **H[2]** reported, *"It helps with designing the school timetables, schemes of work, student progress reports, teacher' assessments, student admission details and records of staff responsibilities"*.

The study found that other types of ICT tools, such as Microsoft Word, emails and browsing the internet were not used effectively by most of the headmasters. This could be related to their lack of ICT skills, as evidenced by **H[4]**, *"My skills aren't that good, but I can use Word, it's the only programme I use most of the time in my job, because, I'm required to write letters to parents, teachers and to the Ministry of Education. I only use emails for personal purposes. I can browse the web, but my skills are limited. I honestly have no idea about other types of ICT; I really think I need training"*.

Despite the attempts of most of the headmasters to employ ICT tools in their daily tasks, the study found differences in this implementation of ICT. What is mentioned above is interesting, since it gives an indication of the weakness of some headmasters' ICT skills. Furthermore, this headmaster, like many, has had no formal ICT training. Therefore, the importance of training in the role of headmasters in ICT implementation and the translation of ICT policy into action are critical issues for the Ministry of Education, which aims to provide training to all staff in the education sector. This will be discussed in more detail in the section on challenges.

b) Creation of an attractive school environment

The principle of creating an attractive school environment necessitates the headmaster playing a multifaceted role, as supporter, encourager, collaborator and facilitator of the use of ICT in his school, as well as paying attention to safety matters. In addition, the principle

[1] It is a comprehensive and integrated program of educational processes, based on the most advanced technology in the field of educational administration, which covers all of the Ministry of schools and educational departments and public administrations in the Ministry of Education and the Ministry itself**.** The system provides online services for students, teachers, parents and school administrators. It is used for the preparation of reports and provides information about the educational process, through a central database linked with other current and future systems. It provides over 2000 electronic services and offers a transmission program (Noor SMS).

of provision of a 'safe working environment' is under the headmaster's responsibility in the first place, and only secondly is it a shared responsibility among the school staff.

In schools **[1, 3]** and **[4]**, teachers and students mainly expressed concern over ICT working conditions and the environment, such as uncovered electrical wires and broken sockets in computers labs. In addition, there is a lack of even the most basic means of safety; for example, most fire extinguishers are out of service, as well as alarm bells not working. Although, **T[1]** , **T[3]** ,**T[4]** and all the students believe it is the headmaster's responsibility, **H [3]** and **H[4]** believe this is the responsibility of the Ministry of Education. Only **H[1]** and **H[2]** acknowledged it is their responsibility.

The variation of views about who is responsible for the principle of safety at school, especially those of some headmasters, gives an indication that the identification of responsibilities by the Ministry of Education is not clear, and this goes back to the lack of clarity in the educational policy. All of these indicators will be discussed later in the challenges section.

Another roles of the headmaster regarding ICT is described by **H[1]** , **H[2]** and **H[4]** as facilitator and implementer of the ICT policies. For example, **H[1]** reported, *"I am keen to translate the policy of the Ministry of Education into action, by providing all the necessary information to my teachers, sharing circulars, and offering regular staff meetings, in order to clarify the Ministry of Education's policy to all of them".*

All the headmasters reported that they encourage teachers to apply ICT in the educational process, with most teachers confirming this with positive indicators. For example, **T[2]** commented, *"Yes, I always find my headmaster supportive; he always encourages and supports anyone trying to use ICT in the classroom".* The headmasters reported that they used many methods to enhance and encourage teachers to apply ICT in the classroom, for instance, by distributing circulars and memos regarding ICT, and also stressing the importance of attending ICT training. Some headmasters, however, use different types of forms of motivation, for example, giving praise and certificates in staff meetings, as well as performance appraisals for those who have achieved successful ICT implementation in their lessons.

However, there is recognition that there are limitations as to what headmasters can do regarding this issue, and the majority of their initiatives and rewards are on a personal level. **H[1]** reported, *" I use the encouragement principle with my teachers, to motivate them to use ICT tools in their lessons, but you should know that the method of honouring distinguished*

teachers is by personal endeavour, by the headmaster alone. There is no special budget from the Ministry of Education to honour teachers".

To ensure that more teachers are motivated, some headmasters have had to introduce a motivational strategy that involves reducing teachers' working hours, with the assumption that those who do not use ICT may be forced to take up the lessons no longer taught by other teachers. Discussing how he encourages the use of ICT, **H[4]** illustrated that he has himself taken such action, "*I try to give some incentives to the teachers who have completed more than 10 training courses in the field of ICT; I also reduce the number of teaching sessions for them, from 24 sessions to 20 sessions per week".*

This initiative was supported by some of the teachers (**T[2] and T[4]**). For instance, **T[2]** commented, " *Frankly there is a kind of support from the headmaster, as well as praise and appreciation from him, which can clearly be observed, especially in the meetings with the teachers".*

Although most teachers acknowledged that they received support from the headmaster when they use ICT in their lessons, some teachers, however, were concerned about the discouragement and limitations headmaster have imposed on the use of the internet as a learning resource. Teachers who report being keen on encouraging students to use ICT urge for a change in perception from the headmasters and some of the teachers, about the importance of using the internet in teaching and learning. Stressing this, **T[3]** stated, "*I think the time has come to change the concept of a ban on using the internet in schools".*

Most teachers reported that a lack of tempting incentives is one of the main reasons for their reluctance to attend training programs. **T[3]** summed this up, "*Most teachers don't like attending training programme, I've already discussed this issue with my colleagues; they question the benefits we get from these kinds of programmes; whether we attend or not, the way we are treated and our salary remain the same".*

Regarding their role as facilitators, most of the headmasters view this particular function as the need to ensure the policy of the Ministry of Education is enforced, and that the Ministry is linked to their school. This results not only in the availability of ICT resources in the school, but also in the reinforcement of the learning processes connected with ICT, and the creation of a learning environment that is both motivating and enjoyable. The headmasters' facilitating role goes beyond the simple provision and maintenance of resources to that of dealing with issues related to complaints. **H[3]** stated, "*I do whatever I can. For example,*

asking for the provision of these devices from the Ministry, as well as following up requests by contacting the Ministry of Education or even going to make the requests in person. I'm keen to make sure our ICT tools are maintained as well as possible".

The facilitation of ICT by headmasters also varied from one headmaster to another, with some regarding offering training, distributing circulars, and monitoring and maintaining learning centres as key contributors to this role, as **H[1]** reported, *"I make sure that the teachers who are proficient in the use of ICT train the teachers who need training. I try to make the Learning Resource Centre a place of thinking and research. I always ask the teachers to involve students in using ICT tools in lessons, because this will help them to prepare for the next stage in their lives. I also monitor teachers' work, and constantly encourage them to use technology in their lessons".*

Some students, however, see some headmasters as not helpful in facilitating the use of ICT in school, stating that the manner in which headmasters deal with them when using the internet and mobile devices neither boosts their confidence nor encourages them. For example, **S[2]** stated, *"The problem is that the headmaster deals with students like irresponsible people or teenagers".* When asked to clarify this resentment, **H[1]** responded, *"We're at a critical stage with what's happening in the world around us. For example, terrorism has led me to ban completely the use of the internet and mobile phones in my school. I know they continue to be used in secret, but I've tried my best to take control over this matter, and I think the internet should be banned in all secondary schools, because of the seriousness of this age and the impact of suspicious ideas on students"*.

Collaboration was realised at various levels, both internally, with students and teachers, and externally, with the Ministry of Education and parents. Commenting on how he ensures effective collaboration with teachers and students, **H[2]** reported, *"*I *take note of the complaints from students and teachers about what they're actually faced with and what they need in terms of ICT tools, and work extremely hard to resolve such issues".* Speaking about this dual role, **H[3]** explained, *"The collaboration is sometimes weak,* as *you know, one hand cannot clap alone, the support from the Ministry is important, as well as the collaboration between school staff".*

Although headmasters reported that they did collaborate with the teachers, some students perceived that this collaboration was ineffectual, and they describe themselves as sometimes caught between the headmasters and teachers. This was highly evident when tools broke

down or students needed access to ICT. **S[2]** reported, *"The way they respond in this situation is not good (teachers and headmasters), and we're the victims, because of the lack of collaboration between the headmaster and teachers in the provision of hardware and maintenance, everyone blames each other".*

c) Controlling, Monitoring and assessment of ICT use

The fourth role provided by the headmaster is a controlling one, which has already been explored in terms of limiting or allowing access to the ICT resources, establishing that most of the headmasters limit student and teacher access to ICT for the reasons identified in previous themes. However, pushed by the need to protect and control information access, especially from the outside world, they also restrict access to online information. This was seen as their main concern, as **H[1]** reported, *"I'm afraid of losing control of the teachers and students, and I worry that the computer lessons will just become surfing the internet… the students are at a critical age and must be controlled".*

Similarly, **H[3]** also raises concerns over internet security and overload on the system, if all the students and teachers have access to the internet, as well as issues of general misuse by the students stating, *"The reason for my concerns is that the Internet has become a big problem for me, especially at this point in time. I remember that seven or eight years ago, it was easier to control the Internet, but because most students now have mobile phones, 90% of them have accounts on some kind of social media. So, opening up the internet for students causes problems in the network load and they sometimes misuse it"*

Recognising the role the headmasters play in valuing the importance of ICT, **T[3]** reported that headmasters can be either facilitators or blockers in the process of implementation. Those who understand the role that ICT plays in education are likely to promote its use, ensure its maintenance, and monitor the teachers' performance in the use of these tools. This is unlikely to be the case with those who do not value ICT.

T[3] commented, *"If the headmaster is completely convinced about the role of ICT tools in education and its benefits, the implementation will be successful, and vice versa".* The process of monitoring ranged from observation of which teachers use the ICT tools, how they are used, as well as reading and signing circulars to provide evidence that they know what is required of them. Some headmasters reported a lack of teachers' skills as a barrier; however, pressure and penalties are used to discipline those ignoring the use of ICT, rather

than offering them skills. Evidently, monitoring should be used to identify needs and provide support.

This is, however, not the case, as stated here by **H[4]**, *"Some teachers don't know how to use ICT tools. These types of teachers are a big problem for me, so, I have to put some kind of pressure on them by decreasing their job evaluation grades (evaluations), and then organising follow-ups by the supervisors and myself in order to force them to apply ICT".*

Monitoring is therefore viewed as a way to limit negative outcomes in ICT use. Some teachers however agree that monitoring is necessary to help identify who to reward and who to discipline, **T[3]** commenting, *"Monitoring the teachers' performance regarding ICT implementation is necessary, as are inflicting penalties for poor student behaviour when using ICT tools".*

The study found differences in the performance of headmasters in assessing teachers in terms of making effective use of educational technology in their lessons. One of the main reasons for ineffective use may be because the majority of headmasters do not pay attention to employing the appraisal grades to urge teachers to use ICT.

Although the majority of the teachers were identified as lacking ICT skills, there is no official mechanism of assessing these skills before teachers start using the ICT resources provided in the school. In addition, as well as proficiency in their use, teachers are also expected to have not only the technical knowledge of how the ICT tools work, but also the skills necessary to maintain them when broken, or at least to identify the problem, regardless of whether they have been trained or not. ICT skills are not mandatory, and, as already identified, most teachers have not been trained.

Some headmasters have however devised a way of assessing teachers' ICT skills. For instance, **H[1]** uses the following method, *"I have to grade each teacher's performance on a scale of 10 (out of 100) in regard to ICT usage, at the end of each academic year".* **H[2]** applies reward and punishment, **H[3]** applies pressure by decreasing the teacher's grades in their job evaluation and uses follow up sessions with supervisors to enforce the teachers' application of ICT.

H[4], however, prefers certificates and other incentives to motivate teachers, and stresses the value of these, *"I think we need to rethink motivation, in my view financial incentive is the biggest motivator for teachers".*

It can be seen that the role of the headmasters in implementing ICT tools is crucial. However, there are some obstacles that prevent them from carrying out their duties. For example, there is a need for some headmasters to raise the level of ICT training. In addition, the weakness of financial support hampered many of them in providing safety measures, periodic maintenance, and also providing rewards to teachers. A lack of cooperation between the parties of interest clearly leads to weakness in creating an attractive learning environment. However, all these factors will be discussed later.

3) The Teachers Role and responsibilities in ICT

This is the final sub-theme in the school level. In this section, two questions were asked about the teachers' level of engagement in ICT training programmes, and to what extent they are qualified to apply ICT in classrooms (skills). Under this sub theme, there were two main criteria (see table below).

Theme	Sub-themes	Criteria	Research Enquiries	Target
School Level Internal Factors	**(3)** **Teachers' role & responsibilities in ICT**	❖ Developing technological and pedagogical skills ❖ Employing ICT in the classroom	To what extent do teachers employ ICT tools in their lessons? What is the level of teacher engagement in ICT training programmes? To what extent are the teachers qualified to apply ICT in Saudi secondary schools (skills)?	**All**

a) Employing ICT in the classroom

The results found that teachers have varied views on their own roles in ICT implementation. Some teachers, for example, **T[2]**,urged for a complete change in the school mentality and the way teacher's roles are viewed, which were currently seen as the only source of information. Some teachers urged that their role should also be perceived as a guide and facilitator of teaching, and recommended a shift in outlook, that instead of being attached to the idea that a good teacher is one who uses what is described as punishment and prevention, they should rather be seen and measured by the strength of their performance and the information that they provide to learners.

However, there are some teachers, who have not yet embraced the implementation of ICT technology in their lessons, such as **S[2]**, who reported, *"I really respect a teacher who uses ICT, and feel such a teacher has integrity, because he's keen to make the lessons more interesting, but I'm really bothered by the fact that some teachers are unable to use educational technologies or even deliberately ignore them. To be honest, I don't respect*

them at all". In contrast, it is also notable, that some teachers are, indeed, aware of the need to respond to these changes. **T[2] ,** for example, is fully aware of his duties regarding these tools, "I *feel what my students need is for us to change the routine of traditional teaching, and I feel responsible for instigating change and renewal, so, I use them as much as possible, because I'm convinced of their importance in education".*

As identified in the previous section, not all teachers use ICT, and the study confirmed that most of the teachers did not employ them at all. The following sections give some examples. **H[2]** stated, *"Frankly, and to be honest with you, not all of my teachers use ICT tools in their lessons; only about five to 10 % of them regularly use them in their classrooms".*

Expanding on this, **H[3]** identified three categories of teachers, thereby further clarifying their roles in ICT, *"The first category is the enthusiastic group, and there are unfortunately very few of these, they look out for these tools and are keen to be provided with all the latest devices. The second group isn't at all interested and unfortunately, there are many of these in my school, they even fight against the idea of using ICT in their lessons, they don't even try to use it. The final category would really like to use ICT tools in their lessons, because they're aware of their benefits, but they don't, because they don't have any idea how to use them".*

S[2] confirmed this point, *"Some of my teachers really do try to make their lessons more interesting, and they know how to use educational technology in the classroom, but some of them aren't even trying. These teachers should change their methods of teaching, and work much harder to activate ICT tools".* On the same issue **S[4]** added, *"In my school we have lots of ICT resources, but they're treated just as accessories, and their use is limited".*

As most students, headmasters and ICT directors see ICT implementation, primarily, as the responsibility of teachers, the question (the teachers' roles in ICT) was directed only to the teachers. **T[3]** explained his role and responsibility as follows, *"I can describe the way I use ICT as acceptable to some extent. I like using educational technologies, and if I could, I'd use them much more, but there aren't enough devices, and in some classrooms, there's not enough space to use them, because the number of students is greater than the capacity of the classroom. We have classrooms of 45 students, and the distance between the first row and the board can be less than a meter; the situation is difficult, but we do have projectors in some of the classrooms, so these are the only ones that I can teach in when using technology*

devices. Furthermore, there's not enough room even to put a computer desk in the classroom".

In addition, **T[4]** stated, *"The Ministry of Education provides the school with most of the ICT tools we need, but the implementation is still weak, because some teachers have no idea how to use these tools, as we have problems with training, so they're not qualified. Some aren't even aware how these tools can make teaching more enjoyable, and some still think that traditional teaching is more effective. In general, some schoolteachers lack the skills required to implement ICT tools, especially the new generation of these tools, such as interactive white boards and projectors".*

In all four schools, all of the students indicated that most of their teachers did not use ICT effectively. Emphasising this point, **S[4]** explained, *"Few teachers use ICT tools in my school, most still just use pens and a board, and sometimes no pens, so our teachers teach us without any learning tools".*

Furthermore, **S[2]** referred to the poor employment of ICT in students' homework. *"I use my computer at home for different tasks, but not for learning purposes, because none of my teachers help us to link what we learn at school with what we have to do at home (by browsing the web).We don't have the research skills, or advanced skills in computers, the only thing we've all learn are the basic skills, which even the students in primary school know,. The vast majority of teachers don't use ICT tools".* It is clear that not all the teachers are able to use ICT tools that only some encourage the students to use them, while others do not use them at all. This will be explored further under the sub-theme of ICT skills.

b) Developing ICT skills and the level of engagement in ICT training

The aim of this section is to explore the teachers' ICT skills and their level of engagement in ICT training programmes. In general, all the participants had varied levels of ICT skills and training, with most headmasters and almost 90% of all teachers with only limited basic skills. This could clearly form a key barrier to positive views about ICT, as well as its implementation. It can be observed from table ** (participants' background) that most teachers have only a few ICT skills, which was reported by all participants as a main factor for the unsuccessful implementation of ICT. The study results show that only one teacher had formal training, whereas three were self-trained. In regard to their ICT skills level, **T[1]** described his skills as poor, both **T[2]** and **T[3]** described themselves as intermediate level, whereas **T[4]** considered himself to be an expert.

Concerning the level of teacher engagement in ICT training programmes, **T[4]** explained the views of his colleagues regarding training, *"I discussed training issues with some of my colleagues. One of them, who teaches the subject of the Holy Quran, told me, 'I don't like going to training sessions, it's just a waste of time, and to be honest I don't have any motivation to use ICT in my teaching. Look at my mobile, it's just a normal mobile, I don't like the new generation of mobiles. I don't even have a computer at home'".* He added*, "One of them told me, 'Why do I have to go for training? I teach the Arabic language subject, and I really don't think I need to use these tools in Arabic classes, I prefer the traditional methods, and I think I'm all the more professional for it".*

Abstention from ICT training programmes, as well as a lack of provision and quality was evident in participants' views. **H[3]** commented, *"About 90% of my teachers aren't qualified in ICT (skills), most of them don't even like training...which in turn makes the implementation of ICT poor"*. Discussing the reasons for the low level of teacher engagement in ICT training programmes, as well as the weakness of their desire to develop their ICT skills will be discussed in detail in the section on challenges.

Despite most teachers emphasising a positive attitude to their role in the activation of ICT, responses given by some school principals and students confirmed that there are deficiencies in their roles, for example some teachers completely refusing this technology, and some believing it is just a waste of time, as mentioned earlier. An interesting point was raised when the headmaster said 'Only 5% to 10% of my teachers have received ICT training'. These results illustrate some of the shortcomings in some of the teachers' roles, which will inevitably be the cause of failure in the implementation of ICT tools. This lack of interest and training will be discussed later.

5.2.3. Government Level

In this section, the study will focus on the role and responsibilities of the Saudi government (Ministry of Education) towards the implementation of ICT tools in Saudi secondary schools, from the perspective of the participants. This theme (Government Role) has four sub-themes (the rest of the 7 sub-themes, policy and strategy, ICT tools and ICT as a subject, resources and creating an attractive learning environment.

4- Policy and strategy

To understand the issues regarding the current ICT education policy and strategy, four questions were asked, and to address these questions, data was analysed sequentially under seven criteria (see table below).

Theme	Sub-themes	Criteria	Research Enquiries	Target
Government Level External Factors	(4) Policy and strategy	❖ Clarifying the education policy ❖ Policies translated into action ❖ Working in partnership ❖ Government support and encouragement ❖ Follow-up and supervision ❖ Staff training ❖ Technical support	✚ What are the objectives of the Saudi education policy regarding ICT in education? ✚ To what extent do ICT stakeholders understand the education policy regarding ICT in education? ✚ To what extent is the education policy related to ICT translated into action? ✚ What role does the Saudi government play in facilitating ICT implementation in secondary schools?	Headmasters Teachers ICT directors

a) Clarity in the Education Policy

In this section, the headmasters, teachers and ICT directors were asked to pinpoint the degrees to which they comply behaviourally with the tenets of the Saudi ICT education policy and what role they play in applying this policy into action in schools.

Most headmasters, teachers as well as directors agreed that the Ministry of Education should take more action regarding the ICT policy. For instance, the studyfound weaknesses in the existence and clarity of the policy of ensuring that the education policy is clear for all within the schools, with all targeted participants emphasising that it is difficult to know what the ICT policy is in its real sense. For example, **H[3]** stated that, "*If you want to know about Saudi education policy in regard to ICT, you won't find anything at all, there's no real source, Don't be surprised, even if you google it. It should really be printed and published for everyone working in the field of education*". Similarly, **H[1]** reported, "*We have circulars and guidelines that we must abide by, in terms of ICT implementation in school, but to be honest, there are no clear structures or strategies about the role of teachers in applying ICT tools in the classroom*".

As a consequence of this, **H[3]** stressed that the Ministry of Education needs to be more actively engaged in establishing their policy, especially in preparing teachers for the future, and they must ensure that teachers are familiar with and follow the policies. He commented, "*For me the policy is clear, but the problem is that it must be clear to every teacher, so*

teachers should read and sign this policy in advance before they can begin working as a teacher. It's the role of the Ministry of Education to take the necessary steps to make sure that teachers are made aware".

T [2] shared a similar view, adding "*ICT policy? I've heard about it, I think it's about the importance of using technology tools in teaching, but I haven't read it, if you ask most of the teachers here their answer would be the same as mine".* He explained quickly that he cast the blame on the Ministry of Education, "*The role of the Ministry of Education should be stronger in this issue; they should educate teachers about their policy*".

In general, the results show a gap between the policy on paper and in reality. For instance, when **T [2]** was asked about his views about ICT policy he said, "*It's just been on paper up till now, I don't think we've reached the required objectives yet*". When questioned about the ICT guidelines, he replied, "*Yes we, continuously receive guidelines about ICT, and we sign them, but the problem is there are no ICT tools available*".

Currently, this remains an issue which needs to be addressed, as described by **T [4]** "*The government should play a much greater role in simplifying its policy and making it easier to understand, also in improving teacher awareness in order to address any misconceptions about ICT*". He added, "*With respect to the Ministry policy, I think it's still unclear*".

Headmasters are clearly unable to enhance the operational aspects of ICT, if the Ministry of Education does not implement a clear policy and strategy on this issue. On this matter, **H[4]** illustrated this disconnection between policy and practice, "*I know that we're responsible for the follow-up and activation of this policy on the ground, but, to do this, the Ministry of Education must carry out its responsibilities, we must have comprehensive and mandatory training with respect to ICT, and I stress the word mandatory*".

A greater ore awareness of ICT policy is clearly crucial, and in support of this view, other teachers suggest the need to increase awareness, as well as to highlight the value of ICT, and also to facilitate the process and development of education through its use. **T [4]** echoed the views of **H [4]**, who had called for an improved plan and strategy for communicating policies at school level, stating, *"There must be effective plans and strategies from the Ministry of Education in regard to the implementation of ICT in education; there's currently no clear policy, so each headmaster has to strive hard and work in his own way to make the implementation of ICT more successful. In most cases, there's a failure, due to the lack of planning. I've worked in several different secondary schools and I've come across a lot of*

technological equipment laying idle, and I think one of the reasons for this is related to the lack of clear planning and policy".

This lack of awareness can also be attributed to a disconnection between policy objectives and their translation into action, especially in regard to the implementation of ICT in the classroom. For example, it was evident that any policy documents and circulars are mainly directed to the headmaster, following which the teachers receive instructions from the headmasters without sufficient ICT resources to enforce these guidelines. Indeed, teachers seemed to prefer training as a way to keep themselves more informed about ICT policies, while some teachers distanced themselves from policy issues, regarding them as the preserve of the headmaster alone.

Thus, clearly, there is a need to raise awareness. Acknowledging this gap, **T[4]** provided a clear example from the teachers' perspective, "*It's not my business to implement ICT policy, it's the role of the head of school, it's him you need to ask this question to. If I'd actually received guidance about ICT usage in teaching, then obviously, I wouldn't need to ask, 'what do you mean by ICT policy?', we haven't received any information at all ; we just follow what the headmaster asks us to do, and of course, he's the executor of The Ministry of Education's policy"*.

This lack of clarity within the ICT policy has left it open to individual interpretation by most headmasters. In order to ensure teachers are better informed, **H[3]** recommended a proposal to offer these guidelines to teachers at schools before the implementation of ICT , "*I think it would be a good idea to inform teachers about the education policy. There should be a book of guidelines, explaining the Ministry's policy on the application of ICT tools, which should be distributed to teachers at the beginning of the academic year, so that they can familiarise themselves with the issues*". Similarly,**T[2]** stressed, "*We need planning; we need long and short-term strategies to reach achievements similar to those of developed countries*".

When the director of ICT was asked about this issue, he diverted the blame away from the Ministry of Education, reporting that it was now in fact developing resources in terms of booklets and pamphlets on different issues and subjects, with the goal of ensuring the implementation of ICT into every teaching and learning process at school. He added thatvarious circulars, that aim to reinforce the use of ICT in schools, are also currently being sent to headmasters,. However, it was clear that most teachers still feel disconnected, and

that this gap needs to be addressed. Expressing optimism about these improved guidelines, **T[2]**, stated, "*I think it might be possible with these, but we need much better plans for the future*".

Translating policy into practice is still a challenge for teachers who are supposed to use the policy operationally, but do not understand the rationale behind it, or perceive that this is not their role. Explaining his understanding of the policy, **T[2]** commented, "*My understanding is that using modern tools of educational technology is one of the new roles of teachers; teachers must use ICT tools in their lessons. Frankly, I'm not interested in knowing about the ICT policy, because nobody is likely to ask me about it*".

Although most of the headmasters emphasised that they have a positive role and an understanding of the requirement to translate ICT policy into action, the results showed weakness among teachers in this matter. This could lead to the conclusion, that there is a clear absence of supervision and follow up by the Ministry of Education and also by the headmasters, which will be discussed in a later section.

b) Policies translated into action

Although the previous results showed complete agreement between the headmasters and teachers about the importance of the role of the Ministry of Education in making ICT policy clearer and more applicable to practice, nevertheless, all the headmasters acknowledge that, at the school level, ICT implementation is considered to be their responsibility alone, and they recognise the challenges in translating the policies into action. **H[1]** spoke about this issue, "*It's like fighting a losing battle in this respect, I'm not at all satisfied with this issue, I'm always under pressure from the Ministry of Education to make the implementation of ICT more effective*". To translate policy into action, the Ministry of Education needs to commit to its share of the planning process, and, according to **H[2]**, "*To do this, the Ministry of Education must carry out its full responsibilities*".

Although all the headmasters expressed positive views towards ICT, with most enthusiastic about teachers using it in teaching and learning, the way in which each of them employed strategies varied. For instance, **H[4]** did not limit himself to the ICT policies, he also developed strategies to ensure teachers were well trained, as well as providing a supportive conducive learning environment, as detailed below.

"*The development of a policy or strategy for any kind of work is something that is considered very important, so I have strategic goals based on the education policy, and one of them is the need to implement and employ ICT tools in education. This strategy is based on providing*

ICT tools, carrying out periodic maintenance, providing teachers with adequate training, as well as encouraging teachers to use and activate ICT tools in the classroom. In general, our current education policy emphasises that traditional education is outdated and that a modern style of education should observe the wishes of both students and teachers".

However, when **D**[1] (as a representative of the Ministry of Education) was confronted with the shortcomings in the Ministry of Education's role in regard to translating the ICT policy into action, he quickly averted blame, by confirming that the department of computers and ICT, which was under his management, carry out their duties according to the means available, outlining that the supply of resources and guidelines in using the ICT tools, as well as staff training, were the ways the policies were actioned, adding, "*Our department is also committed to providing software applications for education, that could help teachers and headmasters of schools in the completion of electronic transactions*".

The results also showed that most ICT tools received no periodic maintenance and if tools became faulty, it was a long time before they were repaired. This supports the previous results, which indicate that policies are seen as a paper document that is not translated into reality, to help with ICT implementation in schools.

Training was also identified as an important step in facilitating the translation of policies into action. Emphasising this point, **H**[3] commented, "*We must have comprehensive and mandatory training with respect to ICT, and I stress the word 'mandatory'*". Not all teachers, however, are interested in training. With no formal repercussions for refusing to train or for showing negligence in the use of ICT tools, teachers clearly have no accountability regarding their use of ICT.

This gives some teachers limited options, and some take drastic measures, as explained here by **H**[4], "*Most teachers don't want to train, there are no incentives and there's no disciplinary action for negligence. As a result, we have two situations, either devices become disabled, due to misuse, or are abandoned in a storeroom, both of which result from the inability or unwillingness to translate this policy into action*".

Most teachers and headmasters indicated that much more needs to be done to improve the education policy. Some teachers even reported having to use their own ICT resources. Furthermore, most policies are discussed for a long period of time before being effected. This point was illustrated by **T**[2] , "*Many teachers provide a great number of computers or ICT tools themselves. In regard to the ICT policy, the Ministry's plans are to replace paper*

books with e-books, and every teaching method is to be via ICT tools, but we've heard about this for a long time and the improvement is disappointing. These changes need to be done gradually; we need clear strategies and policy translated into action". In addition, the planning strategy does not fit the teachers' visions. The need for training and understanding the policies before implementation is crucial, especially during new teacher training courses. This lack of preparation in the abilities to use these tools could also be creating a huge gap in skills, which will be discussed later.

The previous results clearly indicate that the policy of the Ministry of Education has a weakness in regard to its translation into action, and all the factors mentioned above concerning this issue overlap with many internal and external aspects. The following sections will discuss some of these factors in more detail.

c) Working in Partnership

One factor that the literature review identified for the successful implementation of ICT is 'working in partnership'. The results did in fact show some coordination between schools and the Ministry of Education in terms of preparing school buildings for the future, with collaboration between the Department of Education, the relevant authorities as well as other ministries dealing with technology. This is due to the Ministry of Education having a significant role in commissioning communication as well as developing ICT as a subject and technology as a whole. In addition, in terms of monitoring and reporting, ICT directors and headmasters share reports. However, the study results identified a lack of collaboration in reporting the specific needs of the schools in terms of ICT resources.

Headmasters as well as teachers highlighted a lack of collaboration at all levels, and this contradicts the perceptions of the Ministry of Education. This is summed up by **H[1]** who commented, "*In regard to ICT implementation, there's a lack of collaboration between teachers and myself, as well as the Ministry of Education. There's also a lack of proper structure. If we want to make the implementation of ICT more successful, we should all work together, not put all the responsibilities on my shoulders alone*". In support of this, to address these varying issues, **T[4]** also stressed the need to work in partnership, not only with the departments in the Ministry of Education, related specifically to ICT, but also with, for example, the planning, financial and curriculum departments.

d) Support and Encouragement

The study identified that resources, budgets and training are currently implemented using a top-down approach from the Ministry of Education. In this section, the study discusses the support strategies used regarding ICT in schools. The ICT director identified these as training, the maintenance of devices, as well as developing the skills of the technology team. In order to provide this support, **D[2]** explained, "*We have a special department, which provides maintenance and operational safety management for schools, as well as the provision of spare parts. In addition, we have a specialised networks department, all this is to support schools in their ICT needs*".

The study has already identified in the early sections that the majority of schools highlighted a lack of support. The low number of technical support staff could be one reason why the staff are not able to deal with ICT issues promptly in schools. Noting the lack of support from the Ministry of Education in helping implement ICT, **H[1]** commented, *"We have no financial resources and limited support from the Ministry of Education. In most cases, I have to pay myself for spare parts, resulting in financial expenses, which my school cannot afford"*. **H[3]** added , *"As you know, one hand cannot clap alone, the support from the Ministry is important, as well as the collaboration between school staff"*.

Finally **H[2]** stated, *"I have to send out a lot of letters relating to the needs of my schools, but, unfortunately, we're not provided with what we really need".* Only **H[4]** acknowledged receiving support from the Ministry of Education.

Regarding the teachers, most of them indicated that the support from Ministry supervisors was *'weak'*, as reported by **T[1]**, who added, *"their visits (the supervisors) are infrequent and last only an hour or two, and are only every two years".*

Another aspect of government support is related to the level of encouragement offered. The use of incentives was identified by **T[4]** as one effective means of encouraging teachers to use ICT or attend training programmes. According to **T[3]**, "*The headmasters' and the Ministry of Education's incentives in regard to using ICT in teaching are relatively few. They don't provide enough encouragement and support for teachers to feel motivated in using ICT tools*".

However, the Ministry of Education has implemented some incentives to encourage ICT use, by providing certificates in ICT skills, which could encourage some teachers to develop their skills and capacities to further their educational development. **T[4]**, however, conceded

that *"The value of the incentive (just a certificate) is sometimes not enough to encourage teachers to attend ICT training*". In addition, he suggested that, "*I think we need to rethink motivation; in my view, financial incentive is the best motivator*".

Returning to what has been indicated earlier about the need for a supportive and encouraging school principal for teachers to apply ICT in classrooms, it appears from the above results that the Ministry of Education has not provided a clear strategy to motivate teachers to use ICT and to attend the training programmes.

e) Follow up and supervision

Regarding the element of support available, as identified in previous sections, the Ministry of Education has a duty to follow up and supervise the implementation of ICT tools and is required to monitor the performance of ICT in school facilities, including computer labs, e-learning, learning resource centres, science labs, as well as training the staff who use these tools.

However, the results indicated a lack of follow up and supervision in the implementation of ICT tools in schools. In addition, there were shortcomings in the ICT supervisor role, regarding translating educational policies into action. This was confirmed previously by **T[1]**, who reported, *"In general, the supervision from the Ministry of Education is very weak, in over two years, I haven't seen any supervisors of ICT in my school".* This could explain why most teachers indicate that policies are just paper ones.

All the teachers and headmasters highlighted the importance of the role of the Ministry of Education in supporting and following-up ICT implementation in schools. In this regard, **T[2]** emphasised, *"It's not enough for the Ministry of Education to simply provide massive funds, which are then pumped into the field of education for the implementation of technology, with no follow up, support and improvements for any deficiencies".* This view was also shared by **H[1]**, **H[3]**, **T[3]** and **S[4]**. In general, most participants identified shortages in support in technical issues and training in ICT, as one of the barriers for successful ICT implementation, which will be discussed in the next section.

f) Providing Training and Technical Support

In this section, the study aims to provide information about the general situation related to training and technical support.

As mentioned earlier, there are many neglected devices in the school stores, or even in the classrooms, which have not worked for a long time, and this is of course due to the lack of

technical support. Regarding this issue, **D[1]** confirms that providing technical support, supplying ICT tools and maintaining laboratories are the responsibility of the government. However, he does not admit to or deny barriers concerning these issues. For example, when asked about maintenance, he was quick to emphasise, *"If the spare parts are available at the maintenance workshop, the repair will be timely"*.

This could lead to the conclusion that the procedures of the Ministry of Education in regard to maintenance need further development. Referring to this, **H[1]** commented, "*The Ministry of Education needs to improve their procedures for providing support for schools, they need to move away from working randomly, with no clear plans and no fairness in the distribution of these tools to schools*". This headmaster raised an important issue when he added, "*There is a kind of favouritism*". This issue will be discussed later.

A lack of provision or the poor quality of training programmes, was reported by both headmasters and teachers. Although the government has the responsibility of developing teachers' skills in using ICT, this is not happening in reality, and even when training is available, not every teacher can benefit because, in most cases, the headmasters have control over the selection process, which is also reported as unjust.

Commenting on this, **T[1]** reported, *"The Ministry of Education says that teachers should be trained in educational technology, but the training programmes are very weak and limited, also the headmaster selects only his close friends to do them*".

Due to this inaction from the Ministry or from the school leaders, most teachers reported that they took their own initiative to train. **T[3]** stated, "*Unfortunately, most teachers are self-training. They learn by trial and error, I'm not going to wait for the headmaster's generosity to accept me onto a training programme. I've had to take the initiative myself and I've engaged in lots of different ICT courses, which, of course I pay for from my own pocket*".

5- ICT as a specialist subject

In this section, two questions were asked concerning two criteria. (See table below).

Theme	Sub-themes	Criteria	Research Enquiries	Target
Government Level External Factors	**(5) ICT as a subject**	❖ Quality of ICT as a subject ❖ ICT tools related to ICT courses and national curriculum	✚ What level of quality does the subject of ICT have? ✚ What is the level of quality of the computers (hardware and software) and their compatibility with what is currently taught in the subject of ICT?	**Headmasters Teachers Students**

Regarding the need to provide the appropriate ICT tools, which are compatible with the national curriculum, **T[3]** stated, *"Many of our subjects require specialised tools, I mean ICT tools should be available, easy to use as well as attractive. Using old fashioned ICT tools is not compatible with some subjects. It's not logical, for example, to teach how to use PowerPoint software when such software doesn't exist. In other words, the tools must be available to assist with, and complement, what we teach. In addition, there's little point in asking students to do internet searches, when our computer labs have no access to the internet".*

For the ICT tools to be effective and for the ICT implementation to be successful, there is a need for development in the subject of ICT. All the participants acknowledge that the current subject is weak, and students already know more than what is being taught, so there is no motivation to learn, as there is nothing new. **S[1]** reported his ICT teacher's response when the students informed him that they already knew what he was teaching, *"My teacher said, I'm here to do my job, this is what we have (ICT subject) and I have to teach it".*

Students are also clearly aware that outdated computer programs are not suitable for some of the ICT subject matter and development is needed. **S[3]** summed up the opinions of most of the students when he said, *"The subject of ICT is very shallow and doesn't provide anything new for me, can you believe it, they taught us about the Fax machine, which is obsolete. We're in 2014!".*

Most participants also reported a lack of software, with some schools still using XP software, and people using Windows 8 and 9 during the research period. **S[4]** reported, *"The programs are so basic and most of them are old, and a lot of essential software and programs are missing as well".*

To conclude, it can be clearly seen that there are serious deficiencies in teaching the subject of ICT, and that it needs more development, and, in addition, most of the hardware and software is not compatible with what is currently being taught. This issue will be discussed further in the section on challenges.

6- Resources

This section aims to present the different types of resources, which are required for ICT implementation in schools. The term resources, in this section, relates to three types of resources, financial resources, human resources (qualified teachers) and ICT resources

(devices). The participants were asked to evaluate the current situation of these resources. (See table below).

Theme	Sub-themes	Criteria	Research Enquiries	Target
Government Level External Factors	**(6) Resources**	❖ Financial resources ❖ ICT resources ❖ Human resources (qualified teachers)	What is the level of availability of ICT tools and financial resources as well as qualification teachers (human resources?)	**Headmasters Teachers Students**

a) Financial resources

Within this section, the results discussed the need to provide financial resources for schools to help in ICT implementation. The director of the computer department oversees this funding and ensures that all statistical information is provided to the Ministry of Education for planning, budgeting and procurement purposes.

The department provides resources for maintenance as well as operational costs. The director acknowledges that although needs have varied over the years, the budgets remain the same. Confirming this issue, which was raised earlier by headmasters, **D[2]** reported, *"The budget that was devoted to The Department of Information Technology is inadequate , and hasn't been changed for years".*

When asked to explain further, he elaborated, *"The Ministry of Education supports us in financial issues, through the project of 'Tatweer'* (King Abdullah Public Education Development Project- see chapter 3) *by providing computers to the schools, which, to some extent, has helped to deal with the deficit in the number of computers".* Within these budgets, plans for ICT tools, such as computers, are then provided. At the time data collection was being conducted, **D[2]** reported, *"50% of all the schools in Jeddah have been equipped with computers and the remaining provision is planned for the following year".*

Regarding the framework of operation for financing resources in Jeddah schools, **D[2]** explained this as follows, *"The budget that has been allocated from the Ministry of Education this year is (5,025,600 RS) for Jeddah secondary schools. In addition, SR 7.200000.000 will be used to provide ICT tools for schools. SR 16.500000.000 has been distributed for the schools within their operating budget in the areas allocated to their educational requirements ".* He added, *"The number of students at the school is the standard used to control the distribution of money".*

In this regard, all headmasters and ICT directors maintained there was a lack of financial resources, for example, **D[1]** said, *" Even though there is a huge budget from the government allocated to education, this doesn't mean all or most of it goes to the ICT department. Furthermore, a large part of this budget goes to salaries, the construction of new schools and the rest is for school equipment, educational supplies and training programmes".*

D[2] added,*"Our budget is limited, because what was originally devoted to the Department of Information Technology was not enough to equip the school with computers and other services. Therefore, we are trying to provide the schools by means of what is available as best we can. We are talking about girls and boys schools in one of the largest education areas in the kingdom (more than 2,000 schools), if we assume that we've provided each school with only one computer, as the average price of the computer is 3000 Riyals, we need six million riyals; the budget allocated to us in this area doesn't exceed two million, and don't forget there are other projects which need funding, such as maintenance and networks, so we can't spend the entire budget just on the purchase of computers or other devices".*

H[1] complained of the same problem, *"We don't have sufficient financial resources for maintenance, in most cases, we have to pay for spare parts ourselves, and this creates financial expenses for us, which my school cannot afford".*

He explained this issue further, *"Financial resources are a massive problem for me. For example, I have four workers, and I have to pay 4,800 SR at the end of each month for each of them(as a salary), and the only resource I have available comes from the school cafeteria, which is around 5,100 SR, that means only 300 SR are left. So, how am I expected to deal with such problems? How can I pay for cleaning materials, printing paper, rewards for students and teachers? Can you believe this? Sometimes I have to collect money from some collaborative teachers at the end of each year to honour our distinguished students, and, sometimes I even have to pay out of my own pocket for things that the school needs"*.

b) Human resources (qualified staff)

There is no doubt that preparing teachers and administrators to use ICT tools is one of the Ministry of Education's responsibilities. Previous results highlighted weaknesses in many teachers' ICT skills, which is probably due to the lack of training programmes or other factors such as the role of supervisors, which has been previously defined as limited. A large number of qualified teachers is essential to ensure the effective application of these technologies.

All participants agreed that training is crucial, and some of the participants believed that the preparation stage of 'skilling teachers and administrators', should take place before teachers are accepted in their teacher jobs, and that skilled teachers should be in position in schools before ICT tools are provided. According to **H[1]**, *" We should test the new teachers' ability to use ICT tools before giving them permission to be teachers".*

In a similar context, **T[1]** suggested the following, *" I still stress the idea that we need to educate the headmasters and the teachers as the first step, rather than the training coming after ICT implementation, we need to follow this hierarchy: educating, training and then the provision of ICT tools".* In agreement, **T [2]**, stated, *"It doesn't make any sense, we have lots of ICT resources, and the teacher has no ICT skills to utilise and employ them in his lessons. So it's important to educate teachers from the outset, and then they can use what they've learned in their teaching".*

In regard to student responses, most of them acknowledge that the majority of their teachers are not sufficiently skilled in ICT and refer this back to the Ministry of Education, as they are the providers of the teachers. For instance, **S[4]** asserted, *"They really must provide good training in ICT, for both teachers and students ".* Supporting this, **S[1]** stated, *"I think some teachers aren't sufficiently qualified".*

In conclusion, it can be said that the training which is provided by the government is still at an early stage, and clearly needs further development, as the quality of these programmes do not currently meet the school staff requirements. Furthermore, the government should pay more attention to the teachers who are reluctant to attend them. This is considered by all participants to be a huge barrier, and this issue will be discussed later.

c) ICT Resources

In this section, the study explores the approach that the Ministry of Education follows to provide schools with ICT tools, and the extent of ICT availability. The study found variations in the availability of ICT tools between schools. For example, although there are some interactive whiteboards, as well as computers in schools, which benefited from the King Abdullah Project, two thirds of participants acknowledge that there is an insufficient amount of ICT tools in their own schools. For those that had ICT resources such as computers, more than half of these devices do not work. *"The computer lab has 20 devices, 11 or 12 computers of which are not functioning"* (**T [1]**).

Regarding the application of ICT packages available, PowerPoint, Microsoft Word, school websites, as well as the Al-Noor program, which is highly utilised by most headmasters, the

results showed an unfair distribution of resources. For instance, students in schools **1, 3**, and **4** complained of limited resources, while participants in school 2 reported an adequate amount. There were also variations within schools, with some classes having access and others not. **S [4]**, for instance, highlighted the issue of limited resources, *"In my classroom, there are no ICT tools at all, but in the chemistry and maths classrooms, where there are some ICT tools installed, teachers only use them infrequently".*

Summarising the government role in the provision of ICT tools, **D [2]** noted *,"Our responsibilities lie in developing plans and providing schools with the educational technology and learning resources they require and determining the needs of all schools for office furniture, laboratory equipment and educational materials".*

As mentioned early by **D [2]**, the allocation of budget, resources and tools associated with ICT is fully determined by the number of students in each school, which, it would be assumed, is reviewed on a yearly basis, but in reality, this does not happen. Previous figures are used, with no updates as schools expand, resulting in most schools finding they are given fewer resources than are actually required. There is, in fact, no system, which monitors changes in demand and supply for ICT tools, and no updates on what is currently available. Provision is dependent on headmasters' requests, which makes the implementation of ICT resources considerably more difficult.

This was well illustrated by **D [2]**, *"The problem is, we have no clear idea about the current situation in regard to the availability of ICT tools, and what the schools really need. For example, one school might request 10 computers, although they don't actually need this amount, while, another school might ask for the same amount, but actually really need them; there's no database to find out the correct requirements of schools".*

This lack of a clear mechanism for the distribution of ICT devices could create some dissatisfaction between the school principals. This was confirmed by both headmasters and teachers who reported an unfair distribution of ICT resources to schools and the need for more clarity in the procedures. For example, **H [1]** stated, *"Not all schools are the same. The facilities, which we have here, are not the same as the facilities some other schools have, it's not fair on the teachers, expecting them to work in an environment like this with a lack of proper facilities".*

Although some schools do have sufficient ICT tools (school **[2]**), there are still issues of concern with some schools (1, 3, and 4), who reported that most ICT tools are not high

quality and are not well maintained, or in a good condition, often shared and poorly implemented. **S [1]** commented, *"We don't have enough devices in my school, and only a small number of teachers use ICT tools in their teaching. There's a projector in my classroom, but it hasn't been working for at least five to six months"*. In most schools, although computer labs were available, students had no access. **S [4]** complained, *"The computer lab is always out of service".* Such comments were echoed by all the other students and teachers in schools **1, 3**, and **4.**

Another issue is that of a lack of supervision. Both when ICT tools are being used, and in situations where they are not functioning properly, teachers often leave students unsupervised. In addition, the use of available resources and tools is also limited in some schools to once every two weeks. **S [1]** commented, *"The computer teacher usually leaves us alone, without any supervision. He actually leaves the lab completely, we often only go there when one of our teachers is absent to play computer games"*.

Although the Ministry of Education is the main provider of ICT resources in schools, to cater for the high demand, schools and parents often choose to provide computer labs themselves. In some of these labs, schoolteachers are allowed to bring in their own laptops, but students are restricted to only using the tools available at school. **T[2]** commented, *"The two computer labs were renovated this year. The Ministry of Education provided the school with only one computer lab; the school and parents provided the second"*.

Despite the huge spending of the government in the field of education, the results found clear deficiencies within the Ministry of Education, which can be summarised as follows. There is a lack of qualified teachers in ICT. Financial support to the schools in order to overcome obstacles such as maintenance and other services is still limited. For example, in the previous section, the study identified that some schools and parents have had to build computer labs themselves to support student need when there is only one provided by the Ministry of Education. There is also no database in regard to the availability and needs of ICT in schools, and this is a real problem, as described by most of the participants.

7- Create an attractive learning environment

This section aims to investigate the extent to which the school buildings provide an 'appropriate environment', which can offer different facilities to support ICT application, such as safety, and the availability of educational spaces in terms of use or after use (storage) of ICT tools. In addition, other factors affecting the school environment are explored in this section, for instance ventilation, the rate of humidity and temperature, and other factors that could affect the efficiency of ICT tools, as well as their impact on school staff, as stated in

the literature review. To understand the significance of the school environment, some questions were asked which covered five criteria (See table below).

Theme	Sub-themes	Criteria	Research Enquiries	Target
Government Level External Factors	(7) **Learning environment**	❖ Appropriate physical learning environment (Spaces, safety and security) ❖ ICT facilities and infrastructure	What is the current situation of the school building in regard to facilities, infrastructure, space, safety and security?	**Headmasters Teachers Students**

D [1] and **D** [2] stressed that one important role of the government is to create an enabling learning environment by providing facilities such as ICT tools, as well as the technical support required to use them effectively. The collaboration between administrators at various levels, as well as teachers, was viewed by the directors as crucial for enhancing and enabling an environment conducive to learning. The majority of students stated that the school environment that they learned in was unsuitable. Concerns ranged from a lack of resources, health and safety issues, overheated computer labs as well as unsatisfactory basic equipment such as tables and chairs. **S** [4] illustrated this, commenting, *"The state of my classroom isn't good; there's been no attempt to even get it ready for ICT".*

S [1] added**,** *"Even the teachers complain all the time about the school environment"*.. Regarding this issue, teachers similarly stressed the lack of space and an unattractive learning environment that fail to enhance the implementation of ICT. **T** [1] commented, *"The greatest problem, in my view, is the lack of space in the classrooms and the computer lab for the use of ICT, and the headmaster should fulfil his duties regarding this issue".* Although there are specific policies in place and the role of headmasters are clear concerning ICT, teachers indicate that this is only theoretical and does not normally translate into action. **T** [1] added, *"But this is just ink on paper; up to now, we have not reached the required objectives".*

T [4] summarised some of the problems related to the school environment, *"The policy indicates the importance of the learning environment, stating that each student should have access to a computer and be able to work and learn in computer labs. The large number of students and insufficient number of computers have made this policy difficult to implement, as well as limited classroom space, only 10% of the classrooms contain ICT tools. Furthermore, there is no internet access for students".*

The results also showed that the classroom environment needs improvement, with most school staff expressing their dissatisfaction. Given the geographical location of Jeddah city, which causes it to be humid, the classrooms need to be adapted to accommodate ICT tools and provide well-ventilated ICT rooms. **T [1]** emphasised, *"The classroom environment still needs improvement, every part of the school should be provided with air-conditioning to create a healthy environment for students and teachers, the classroom size is another important issue, especially for secondary school students"*. **T [4]** added, *"Providing an appropriate environment is important, the school building is demotivating and does not promote learning"*.

Although promoting an attractive learning environment is clearly the responsibility of both the Ministry of Education and headmasters, the study, however, found agreement among most participants, except the directors, that their school environments are still inappropriate for the use of ICT tools and do not promote learning and teaching.

5.2.4. Challenges

This section aims to provide the main challenges that face ICT integration in Saudi secondary schools, from the participants' perceptions. It is divided into two parts:

a. External challenges, which related to the government role (Ministry of Education)
b. Internal challenges, which related to all internal factors (within the schools)

a. External challenges

1) Lack of adequate ICT resources

Although the Saudi government has allocated a significant budget to support the integration of ICT in education, the results of the study, however, indicated that there was a great deal of resentment expressed by the majority of the participants about the deficiencies and the lack of sufficient ICT resources (hardware and software). This challenge was viewed as one of the main obstacles that might hinder ICT application in schools.

The problem of unavailability or a lack of resources was clear in three of the schools, 1, 3 and 4, while the fourth school, in contrast, had a surplus of ICT tools, requiring storage. This leads us to an interesting point raised by **H[3]** regarding maldistribution by the Ministry of Education, which is another serious obstacle to ICT implementation, *"Some schools have a surplus of devices, and nobody can deny that. The problem is that the requests do not always tally with what is provided, I mean, what we ask for is not up to us,*

they just send us what we don't need, because they just want to get rid of some devices, so their fate, at the end of the day, is the storeroom".

Most students (**S [1]**, **S [3]** and **S [4]**) reported the lack of a sufficient number of computers and the lack of access to the internet. Interestingly, some students reported that they were asked to bring in their own computers (anyone who has a laptop) because either the ones in school were broken or there were not enough available to use. This was very common during exam periods. **S [1]** commented, *"There are only 17 or 18 computers which have to be shared between 42 students".* When questioned about the current situation regarding the availability of other ICT tools, **S [1]** continued, *"The most important thing for us as students is to practise what we've learnt from the teacher on the computer, and this stage is missing, because of the lack of sufficient computers, and because the majority of them don't work satisfactorily".* **S [3]** concluded that, *"The majority of my teachers don't use ICT tools", and when* asked for the reason, he referred to the limitation of ICT resources. The picture below clarifies this situation.

Picture 5.1 Computer lab in school [1]

Teachers recognise that the lack of computer facilities and an unattractive learning environment has limited the implementation of ICT, with the result that not only students, but also teachers, are forced to bring in ICT tools from home. This kind of situation was described as not what they had expected and was a deterrent to the adoption of ICT by teachers. Explaining this situation, **T [1]** commented, *"The reality is not as we had hoped; this lack of ICT resources makes many teachers refrain from using ICT tools".*

A lack of sufficient ICT tools was also reported in school 3 and some teachers, for example, **T[1]** , stated, *"We have four students per computer".* This supports an earlier report by

students, but contradicts the government's pledge in its policy that outlines the provision of one computer per student. It is therefore not surprising that **T [4]** raised this important question, *"Why shouldn't the schools have enough computers, when most households have at least one".* He added the view that, *"ICT is a source of knowledge, schools should have sufficient resources to build on skills that can be transmitted and improved at home, not vice versa".*

2) Lack of ICT quality

H [4] recognised some weaknesses in the quality of ICT tools, attributing this to deficiencies in the ICT departmental budget, commenting, *"The fact is that some ICT tools are very expensive, so we try to provide what is compatible with our budget"*, while **H [3]** added, *"the poor quality of some of the ICT tools is generally why they malfunction, I don't think these devices are worth the price paid for them. The government should reconsider its purchasing policy".*

H [1] considered the reasons for this, *"Believe me, this is due to the exchange of interests between some officials in the Ministry of Education and the suppliers of these devices".* When asked to explain more, he was reluctant to elaborate on the issue, pointing out, *"I think you got what I mean".*

This leads to an important point, which has already been raised, namely that the requirements of each school and the quality of some ICT tools are not currently dealt with on an equal basis, which is clearly connected to the issue raised by **H[3]** , the role played by the exchange of interests and favouritism.

3) Shortcomings in ICT as a subject

All the participants acknowledge that the current subject content of ICT is weak, as most of the students' knowledge of the subject is greater than the course content, resulting in a lack of motivation. There is clearly a need for development in this area. . Students also reported outdated programs (software), which were incompatible with some of the ICT subject matter. **S [3]** summed up the views that most students expressed, *"The computer subject is very shallow and doesn't provide anything new for me, can you believe it, they even teach us about the fax machine, which is obsolete and we're in 2014 now".*

Further issues of concern were that most computers were not regularly upgraded and most schools were using XP, and Windows 8 and 9 were used during the research period. In addition, some of the programs were extremely basic and some computers were also reported

to lack the necessary software. **S [4]** reported, *"We only study basic ICT skills, and a lot of the software is missing".*

To conclude, it can be seen there are clearly shortcomings in the subject of ICT, with most of the students' knowledge of the subject greater than the course content. Furthermore, the hardware and software are incompatible with what is currently being taught. This can, additionally, be considered an influential factor on the effectiveness of ICT implementation.

4) Lack of training

The study found that a lack of training is the most cited factor, which prevents ICT implementation in schools. All the headmasters and teachers, as well as the ICT directors acknowledged that ICT training is a necessity. However, their responses indicated that the training programs are weak and few, and do not help to achieve even the minimum objectives in order to raise teachers' skills, as well as training times often being a barrier to attending training programmes. Regarding this issue, **H [1]** commented, *"The majority of my teachers aren't trained; I think up to 70 or 80% of teachers either haven't received any training, or have only received rudimentary training in ICT skills".*

T [4] added, *"In general, most teachers are self-trained. They learn by trial and error, and most of my colleagues have had no formal training. Training programmes are few and far between, and when training is available, we often don't feel motivated to attend, for example, the content is sometimes only basic or limited, or the time of training is out of our normal working hours. I'm not willing to do this kind of training for nothing; they should pay us".* **H [2]** confirmed this point, *"Even if there is a course offered, teachers are often not keen to attend, because either the time of the course isn't suitable, or the quality of the training sometimes isn't very high".* This is also supported by **T [1]**, *"The time of the training can be a huge problem, because most teachers have to teach 24 lessons a week, and the trainers are sometimes not qualified".*

D [2] also reported, *"Training is available, but it's usually unsatisfactory, and sometimes even has a negative effect, because some teachers receive training from people who are unqualified, so they convey their experiences ineffectively".* **T [2]** was incredulous, *"What training? We don't have any training, training is only very limited and not available for us at all times".*

5) Lack of pedagogical training

Although ICT skills are undoubtedly necessary, pedagogical training should also be provided to school staff. Regarding this issue, **D** [1] reported, *"There are many teachers who still have only limited knowledge in how to integrate ICT tools in the right place and at the right time. I mean, even after having completed ICT training, teachers still face challenges in incorporating the knowledge acquired".*

Therefore, he considers that for the successful implementation of ICT tools in the classroom, teachers should have a comprehensive knowledge of technology, pedagogy, as well as content, these elements interacting to provide an understanding of content delivery, using the most appropriate pedagogy and technology. Knowledge in all these areas, as opposed to ICT training alone, can place teachers in a better position to make effective use of specific activities to improve student learning.

The implication is that teachers should receive not only ICT training, but also pedagogical training. Commenting on this, **H**[3] stated, *"We need to transform our concepts and philosophy about traditional education, especially in relation to how to achieve good learning outputs by using (ICT) to improve the environment of education and learning".*

T[1], suggested that pedagogical training should come first before using ICT tools and even before training how to use them. *"I still stress the idea that we need to educate the headmasters and the teachers as the first step, rather than the training coming afterwards, we need to follow this hierarchy: educating, training and then the provision of ICT tools".*

To sum up, shortcomings in training programmes and their timing were identified as major barriers to ICT implementation. In addition, the study found that deficiencies not only in ICT skills training, but also in pedagogical training, were other significant issues in preventing successful implementation.

6) *Lack of Education policy or strategies*

The study found confusion in most of the participants, either in terms of understanding the concept or the objectives of the education policy. As previously explained in the section on government roles and responsibilities, there was found to be a lack of clarity in the education policy, as well as deficiencies in applying this policy into action.

The majority of participants agreed that the education policy needs to be developed, and more importantly, that updated information should be circulated, by publishing it in the form

of booklets or circulars providing easy access. This was considered especially important for the new teachers.

In summary, it is inevitable that such a lack of clarity in the education policy, especially regarding the application of ICT tools, is bound to lead to failure in many areas. For example, although the policy aims to provide training to all school staff, training programmes have been either inadequate or not even in existence, which in turn could lead to failures in ICT implementation. In addition, although this policy aims to transform education from traditional teaching to e-education, the provision of ICT tools in schools is often insufficient.

7) Lack of technical support, maintenance and supervision

The study found unanimous dissatisfaction with the lack of technical support. **T[4]** reported, *"Most devices are broken and have been abandoned in the store room and the school administration doesn't have sufficient resources to fix them".* (See example in the figure below).

Picture 5.2 Abandoned devices in school storeroom

One of the reasons for the lack of technical support was described by **D[2]**, *"We have limited technical workers and there is no specialised training courses on maintenance for the ICT tools".*

Regarding the ICT supervisors, the study found that the ICT supervisor ratio was one supervisor to nearly 300 schools, and one supervisor to nearly 8000 teachers, and all participants acknowledged that this was clearly insufficient for the needs of the schools. Consequently, there can be no surprise that **T[1]** commented, *"For two years, I haven't not seen a single supervisor of educational technologies in my school",* and that **H[1]** described the support from the Ministry as *"very weak".* In addition, commenting on the time that the technical support takes to respond to school demands (in regard to maintenance), **H[1]** commented, *"It takes a long time and sometimes we have to wait until the end of the term".*

It is axiomatic that this issue affects the activation of ICT tools, as maintenance and technical support are essential.

It also has implications for continuity and the implementation of ICT in learning, if by the time a term is over there have been no resources in an adequate condition to be used. Normally the equipment ends up in the storeroom instead of the classroom. Expressing his frustration **H[1]** explained, *"So, if a device breaks, I lose faith in it, so it has go to the store room. This is carelessness and a waste of public funds".*

The participants, mainly the students, teachers and headmasters, also reported a lack of follow up, support and improvements in the deficiencies regarding ICT implementation from the Ministry of Education. Some teachers were prepared to provide support themselves to address the technical needs in school, but they highlighted the lack of training as the main barrier and the fact that they only rarely saw the supervisors.

D[1] and **D[2]** both emphasise that there is a very high work load and ICT is only a fraction of what they need to do. This means competing needs, little time and resources, commenting, *"Workloads are way above our capacity, so deficiencies inevitably occur".* With about 2000 schools for both boys and girls in the city of Jeddah, the high demand for maintenance issues also means that most schools are not equally served. *"The requests for maintenance are too many"*,**D[2]** commented.

It was clear that the unanimous dissatisfaction with the lack of technical support, supervision and follow-up related to the limited number of supervisors (one supervisor to 300 schools).

8) Lack of collaboration between the Ministry of Education and schools

There was evidence of a reduced or total lack of collaboration between the schools and the Ministry of Education, and often some misunderstanding in regard to the needs identified by the school (real needs) and those perceived by the ministry. The Ministry of Education reported that the issue was not the lack of resources, but rather the credibility of some of the schools. There is a clear lack of priorities and mistrust, and, consequently, reduced collaboration.

The following statement from **D[1]** illustrates this gap, and the need for clear planning between schools and the Ministry of Education, *"The collaboration is good, we support and provide as much as we can and what we think they need. Some headmasters complain of a lack of resources, but we find a contradiction between their demands and the reality. For*

example, when we visit a school to identify its needs, some headmasters complain of a lack of financial resources, meaning they are not able to carry out the maintenance, but by the second visit, we often find some changes and decorations have been carried out, especially in the headmaster's office , implying that they do have some financial resources. I would hope that the headmasters of schools spend such money on providing devices or maintenance as this is clearly far more important than decoration".

However, in reality, what the Ministry of Education perceives as the needs is not always the case. The study found a contradiction in **D**[2]'s statement. For example, he said, *"We support and we visit schools to check their demands".* When he was asked why there were insufficient ICT resources in some schools, his answer was, *"There is no database of what already exists in schools. Also, we don't know how many devices are out of service and which are working".*

The relationship between the Ministry of Education and headmasters, in terms of facilitating the implementation of ICT, is one of responding to pressure and demand, which, in turn, is passed from headmasters to teachers. Furthermore, the headmaster views the situation as working on these issues in isolation, with little collaboration with the teachers and pressure from the Ministry of Education, resulting in a feeling of surrender. For example, **H**[1] described the limitations in his authority regarding this issue, *"There is also a lack of collaboration between some teachers and myself, as some teachers are aware that there are no further actions I can take, which could force them to use ICT. It's like fighting a losing battle, what can I do? [Sad] I am under pressure from the Ministry of Education to make the implementation of ICT more effective. Fine, where is your help (the Ministry of Education) and your support? I can't do all these tasks alone".*

In fact, this leads conclude, that there is a failure on the part of the Ministry of Education to develop a database. It was agreed that one of its basic roles is to monitor the performance of schools and the extent of the employment of these devices in education, and, in addition, to reduce indiscriminate spending when buying new hardware or carrying out maintenance. Furthermore, it should be taken into consideration that there could also be a failure in the role of some of the headmasters, when, in cooperation with the Ministry of Education, they provide incorrect information about their genuine needs.

9) Lack of ICT Resources

In order to avoid repetition, this section will show only issues related financial resources. ICT resources (tools) and the human resources (efficiency of the teachers in ICT) has been

presented in the previous section (Government Level). In general, the study reported shortages in all these resources.

Regarding the financial resources, the study results reveal that Jeddah city is the second largest city in Saudi Arabia, and the number of secondary schools represent 30% of all Jeddah schools.

Despite the large budget allocated to education, this does not reflect what is actually allocated to the ICT department. The director reports that the largest proportion goes on salaries, infrastructure construction, training, as well as other school equipment. Given that the ICT project is so extensive, the demands often exceed what has been planned. However, the current provision for the ICT budget is insufficient to meet these demands, according to **D[1]**. This view is also supported by **D[2] ,** who acknowledged that the current budget has not been changed for years, and does not account for the maintenance and provision of software and other ICT tools, but only for computers.

The current budget is clearly not even enough to equip 30% of Jeddah's school needs regarding computers. According to **D[2]**, *"Our budget is limited, because what was devoted to the Centre of Information Technology was not enough to equip the school with computers and the other services require. If we spent our entire budget on just providing computers and neglecting maintenance, providing printers and internet networks, that means the budget would not be enough. It won't even come near being able to equip 30% of the needs of schools with computers".* Indeed, all the headmasters acknowledged these financial challenges.

Elaborating on the situation in his school, **H[1]** reported, *"We don't have sufficient financial resources. I have four workers, I have to pay 4,800 SR salary to each of them at the end of each month, and the only resource that I have comes from the school cafeteria, which is about 5100 SR. That means, only 300 SR is left, so how can I deal with the other needs of the school, such as cleaning materials, printing paper, and rewards for students and teachers".*

Recognising the strong financial position of the government, **T[1]** explained that resources at the school level do not reflect this, *"Our state is very strong financially, but there are shortfalls in repairs and maintenance; the response is very weak, some devices take months or even longer to be repaired".*

10) Favouritism and maldistribution of ICT tools

Favouritism was identified as another external challenge. Although all the participants acknowledge that it is a problem, some see it as a lesser problem than others. **D[1]** stated that he treats all schools in the whole city in a similar way, and accepts that the problem may have been greater in previous administrations, but not in his administration, saying, *"Favouritism, yes, It certainly exists, but it's limited, and this is just the nature of human beings".* In contrast, **H[1]** identified it as a significant issue, stating, *"Favouritism is a big problem for every headmaster"*. When asked to elaborate, he continued, *"If you have a good relationship with the people who are responsible for providing the schools with ICT tools, all you have to do is make just one phone call to get what you want, or sometimes it's like a mutuality of interests".*

When asked to elaborate further, he explained that the power exercised by some of those in authority leaves headmasters with no voice or power of their own, not only over supplies related to ICT, but also extending to issues, such as school admissions. Such is the power of the ministry that there is often no room for no, as illustrated in the following comment from **H[1],** *"For example, if someone in a high position, in the Department of Education asks me to accept a student into my school, I have to obey, and only then will I be able to fulfil the demands of my school. Even if I don't have a place for this student, I have to accept, in order to avoid further problems".* Expressing his displeasure with this issue, and emphasising what should instead happen, he reported, *"I think every school should be treated equally, everyone on the same level, no preference. At the end of the day, it's the future of our generations, which is at stake".*

Favouritism was also displayed in determining which schools receive training and which receive devices, as some schools are defined as five star in ICT, with all their facilities provided. This kind of preferential treatment affects procedures and operations in terms of when and which resources are given to each school. This practice fosters inequality in schools and affects both teachers and headmasters' commitment to ICT. Arguing for change, **H[3]** declared, *"Yes, favouritism does exist; the manner in which school requests are dealt with doesn't follow the rules, it often depends on relationships, and the exchange of interests plays a big role, this must be stopped, there must be justice for all".*

11) Climate impact

Jeddah city is located in a very hot climate and has average daily temperatures of over 36.3° C, 97.3° F. **H[1]** raised the issue of the climate as one of the main causes of ICT malfunction, and thus the efficiency of ICT performance. In addition, **H[3]** reported, *"One of the main problems is humidity and sometimes dust".* **D[1]** urged that, *"*to ensure their efficiency, ICT tools need to be maintained in a clean environment, ensuring devices are free from dust and moisture*".* Most students highlighted the extreme temperatures they have to work in, with insufficient air conditioning, as well as the condition of the computer labs, which they described as 'rusty and dusty'. Echoing agreement, **S[2]**stated, *"The air conditioning is inadequate; we don't feel comfortable in the computer labs due to the heat, as well as the heat that comes from the computer devices".*

This was further emphasised by **S[4]**, who stated, *"The school environment doesn't help in learning and teaching. This is obvious, and can't be ignored".* The whole of the school facilities are affected and temperatures of 41 degrees (were cited on the day of the interview). The impact of this also affects visibility when reading, as computer screens are continually moist. The teachers argue for better maintenance and control of the learning environment, by addressing the hot and humid weather when planning the learning environment.

Having explored some of the external challenges that affect ICT implementation, the following sections present the final internal factors, relative to the school environment, which were reported by the study participants.

b. Internal Challenges

1. Staff culture and beliefs

Although the results previously showed some positive views towards ICT implementation among study participants, the results also reported some negative attitudes and beliefs among some of the participants.

There was a disparity of views on the impact of culture and religion on internet use and some types of ICT tools at school. For instance, **H[4]** sees the inevitability of prohibiting the internet in schools from a religious belief, because, he explained, , *"I don't want to bear the guilt of students"*, while **H[3]**, from a cultural perspective, regards preventing the use of the internet in schools as one of his duties, in order to protect students from some of the erroneous tenets arising from the issue of ongoing world terrorism in the fear that students might be affected by these ideas.

While all students expressed their discontent over the prevention of internet use in schools, one of them, **S[4],** commented sarcastically, *"The internet is forbidden; yes, it's treated like a crime, there's no way we can use it at school. The headmaster prevents it, because he says that some students use the internet for non-educational purposes. I agree with him, but this is his responsibility and that of the teachers as well; they've taken the easy way out and they're not doing their jobs properly. There are millions of ways to control the internet at school. For example, if every student has a personal computer with a personal user name and password, they can easily be aware of how students use the internet".*

Responses from the teachers were varied regarding this issue, some believing that prevention is the most effective way to prevent the entry of non-Islamic ideas, and to ensure that students are not enticed into terrorist or immoral ideas, while the remainder emphasise the importance of the internet, but maintain that its use should be carefully controlled.

D[1] also identified religion as a barrier in the use of the internet, and as the reason for headmasters restricting its use. In agreement with this, **H[1]** identifies Islamic subject teachers as the main influential factor, saying that these teachers think that internet use at school must be prevented, *"I think this is related to religious and cultural concepts".* Further to this religious debate, **S[2]** described this issue as more of a religious combative approach, likening religious teachers to militants, *"Some teachers are militantly religious; they believe that the use of the Internet in any non-scientific field should be forbidden".* Regarding further religious and cultural implications, **D[2]** added, *"I think male teachers are more highly skilled in using ICT tools, because most female teachers aren't able to attend training programmes outside of the school day. I think this is related to our culture and this is considered to be a barrier".*

Ownership of the learning environment and tools may also influence how learners relate to the tools they are using. In the study, most teachers, headmasters, ICT directors as well as students acknowledge that some students have what is described as, *"Uundesirable behaviour and they intentionally destroy the equipment".* To change this, **D[1]** suggested that, *"the responsibility should not only be with the schools, but also with the parents at home".*

It is arguable that the need for change in some of the beliefs and misconceptions about the internet at school, has become an urgent issue. This can be achieved, as mentioned earlier, by raising the awareness of some headmasters and teachers about the importance of the

internet in education. In this regard, **H[4]** commented, *"Providing schools with ICT tools doesn't necessarily mean that we've applied the concept of e -learning correctly. We should also raise the cultural awareness of the importance of ICT in education, and then apply this knowledge to how to implement ICT in schools; this should include all school staff and students".* In addition, some participants, such as **D[2]**, stated, *"Some cultural issues play an important role and lead to undesirable behaviour. For example, some students deliberately write on the tables and walls or destroy the equipment, and this should be the responsibility of home and school, and some headmasters and teachers don't welcome the use of the internet at school. This is often related to religious beliefs".*

To sum up, the headmasters evidently consider the issue of control and access to ICT as contentious. Despite the current advancements in ICT use, and the fact that technology has significantly improved skills and narrowed the gap with the outside world, as already acknowledged in student research, all four of the headmasters and three out of four of the teachers did not allow students to use the internet, and its use was limited to only administrators and teachers. **H[2]** commented,*"We have a computer lab and the internet for administrators and teachers, but not for students"*, a comment supported by **H[1]** , *"I can't allow the students to use the internet at school",* and **H[3]** ,*"The internet isn't available for students to use freely, or used for teaching purposes".*

2. Shortcomings in the role of the headmaster

The results identified a lack of supervision by the Ministry of Education. However, at school level, the study found agreement that the headmaster, primarily, has a greater role and responsibility in supervising and applying ICT. **H[3]** stressed this aspect, *" My role is to make sure that the classrooms provide a conducive learning environment".* Commenting on this role of supervision, for example, **S[3]** reported, *"If the headmaster was stricter with the teachers, they would use and activate the ICT tools more".* Similar feelings arise if the headmaster has no interest in ICT. **S[3]** commnted, *"The implementation of ICT in my school is ineffectual, and I'm convinced this is because the headmaster isn't interested in supporting ICT".*

Maintenance, at the school level, is also seen as the headmaster's responsibility, which was confirmed by most of the teachers and students. For example, **S[1]** stated, *"The school administration does not respond quickly to the maintenance of these devices. I believe this is the headmaster's responsibility*."

Regarding the headmaster's authority within ICT issues, despite him being the responsible lead at the school, **H[1]** reports this authority as non-existent, even if he does write reports against the teachers. He stated, *"In all honesty, my power is limited in this issue".* Some of the teachers are reported not to show any interest in this issue, and there seems little that can be done to change this, as expressed here, *"The teachers are aware there won't be any further actions taken as a result of this report. Consequently, it's like fighting a losing battle".*

There was a strong feeling of punishment and reward, and headmasters felt that their lack of authority was often challenged, because the teachers were not disciplined for failure to implement ICT, and **H[1]** used this proverb to illustrate the issue, "*Who is certain that there is no punishment will offend morals"*.

The issue of incentives has been recurrent in all subthemes, with both incentives and penalties viewed as barriers to accepting ICT. Teachers are more inclined to support the incentive approach, while headmasters prefer to use penalty/discipline as an alternative. However, some headmasters propose both, depending on the motivation provided by each approach. ICT in this context is not viewed as a tool to enhance skills and develop the teaching role, but as an extra burden that requires rewards for teachers to become more involved, so teachers need incentives to use ICT, to train, and to keep performing and implementing the ICT tools.

The preferred incentives are monetary, and although some headmasters give grades or marks for performance, praise teachers at meetings and encourage many to keep ICT on the agenda, **T[4]** commented, "*The value of the incentives is sometimes not high enough to encourage teachers to attend ICT training courses"* . Most teachers, in fact, report the need for more incentives to engage. According to **T[1],** not enough is being done, "*The headmaster honours us with certificates or cheap pens; teachers need more than this, such as financial incentives"*.

Offering incentives is also regarded as a new concept, some teachers indicating this trend was not witnessed in the past. **T[4]** commented, "*In the past, the concept of incentives for teachers in regard to activating such tools (ICT) didn't exist"*. Some teachers, however, view certification from the school and the Ministry of education as a positive idea, "*This kind of incentive will encourage teachers to develop their ICT skills and capabilities, especially when there is a plan to follow this up in the educational sector"*.

3. Shortcomings in the role of the teacher

Regarding the teacher's enthusiasm in using ICT, there was evidence that a small number of teachers disliked using it in their classes, and preferred traditional methods of teaching. The fear of using ICT was associated with the perceived threat that they might lose control of the class, as they would not be able to limit what students could access, especially on the internet. **D[2]** commented, "*They argued that they didn't like losing control and didn't see the value of computer lessons. Students used the computers for different activities, such as browsing and chatting"*.

H[1] believes that the reason for the reluctance of some teachers to use ICT is due to the resistance to change, regarding the issue as, *"Not welcoming this change. They don't care about using ICT tools".* This also could be related to their lack of skills or fear of failure. **T[2]** commented, *"Ignorance of using ICT tools is the major problem, and I can see some teachers have no intention of changing, and, they also might be afraid of failure in front of their students"*. This was confirmed by some teachers, who feel that their reluctance to use ICT is related to a lack of training, rather than a lack of enthusiasm or interest.

In this regard, improving teachers' skills is not just the Ministry of Education's responsibility, but also that of the teacher. There is currently an issue of a lack of ICT skills and experience amongst some teachers, which is reported to affect confidence, with many teachers unwilling to even try to use ICT tools, due to a lack of familiarity and knowledge.

Other teachers report adapting a trial and error approach as a way to learn how to use them. These views are supported by **H[3]**, *"Some of my teachers have received no training at all, which has led to a lack of confidence",*. **T[4]** supported this, *'Unfortunately, most teachers are self- trained. They learn by trial and error"*. **H[3]**further elaborated on the associated fear of embarrassment, *"This lack of experience might be caused by possible ridicule from the students"*. The only way to address these confidence and skills issues is clearly by offering training. This is crucial, as all the headmasters acknowledge that their ICT staff are untrained, "*I feel that many teachers have no idea how to use ICT tools, which is why they're not keen on using them"*.

However, many teachers do not welcome this training, as they have no interest in using ICT in their teaching. **T[4]** referred to one of his colleagues, who teaches the subject of Islamic Education, who told him, *"I don't like training, honestly, I have no motivation to use ICT, I don't like it"*. This issue could be related to religious values as mentioned earlier.

H[4] added , *"Some teachers say they don't have enough time to do advance preparation, in order to meet the requirements of ICT in their teaching"*. In addition, he described the response of one of his teachers as 'shameful'. When he asked him why he did not use ICT in his lessons, he replied, *"I teach the Arabic language subject, and I don't think I need to use these tools in Arabic classes, I prefer the traditional methods and I'm an expert in this subject".*

This category of teachers clearly needs pedagogical training and more motivation and skills in order to be willing to use ICT. The number actually using ICT in schools is low, and **H[1]** acknowledges this, saying, *"To be honest with you, not all of them (teachers) use ICT tools in their lessons; only 5-10 % of them regularly use them in the classroom".*

Although the new generation of teachers are familiar with using mobile technology, it is clear from the results that even these teachers do not want to engage in using ICT in learning, especially regarding the amount of preparation required, and prefer traditional approaches that save time. However, **T[1]** considers that it is experience and skills that are the issue, commenting, *"It is the lack of experience that causes teachers to waste time in preparing lessons, so I think they should take responsibility in increasing their skills and raising their awareness about using ICT in education".* This view is also supported by **S[3]** , who confirmed, *"Most teachers in my school aren't skilled in the use of ICT tools".*

T[2] stated an interesting point about the importance of the teachers' role when they use ICT. Despite the fact that some teachers know how to use ICT, they may not have used it as a teaching tool. This is well summed up as, *"A teacher who is not skilled in ICT use, needs to learn how to use it, whereas a teacher with good ICT skills needs to learn how to employ it in teaching".*

Regarding the lack of enthusiasm, interest and skills in implementing ICT, **S[1]** commented, *"The first obstacle is the teachers' desire to teach, his willingness to teach lessons through the means of technology. They can do it, believe me, it's not difficult, but some teachers just don't like it".* He then quickly added, *"I think some teachers aren't sufficiently qualified".*

Therefore, most participants agree that self-motivation is the most important factor, which can drive teachers to adapt and adopt technology in the classroom. **T[3]** commented, *"Self-motivation is the most important factor. If the teacher is convinced of the benefits of its use, and has the desire and motivation to use ICT tools in teaching, believe me he will be able to break down any barriers. He can find the right place to use it, he can teach himself how to*

use it, he can find solutions for any problem such as maintenance, and he can develop new methods for teaching. Our problem is that we have some negligent teachers; they just ignore these devices without logical reasons". One factor that might contribute to this is a lack of collaboration between school staff.

4. Lack of collaboration between staff

A lack of collaboration between staff has been identified as one of the major issues, the main cause of which is the lack of an organised structure in which teachers, headmasters and the Ministry of Education work together in implementing ICT. Inadequate supervision was also identified as a contributory factor, with a lack of follow up from the Ministry of Education and unclear policies hindering effective collaboration.

In support of everyone working together, **H[3]** used a relevant metaphor *"As you know, one hand cannot clap alone"*. It is essential that, internally, headmasters, teachers and students work together more effectively, as affirmed by **H[2]** , *"We should all work together".* He continued by describing a real divide between the teachers, and raised a new issue entirely, describing, *"The latest generation of teachers as not qualified, lazy and looking for the easiest option"*. Teachers are reported as not taking the teaching profession seriously, as uncooperative, and as a negative influence on others, as reflected in this narration. **H[2]** described this issue, *"The biggest problem, in my view, with the latest generation of teachers is that they are not qualified to be teachers, and they also don't enjoy the teaching profession, so there's no cooperation and no response from them. This is a problem, they don't normally activate ICT tools, and they're lazy and prefer to carry out their work in the easiest and fastest way. They go to class late and they waste time in the classroom by just using their mobile phones and chatting. I warn them by sending those official letters, but to no avail. Such teachers are also a bad influence on others".*

Some students reported a lack of cooperation from the teacher and conflicts over the use or non-use of ICT within the subject area, with students requesting to be given more ICT input. **S[1]** narrated a response to their demand for a higher quality of teaching in the subject of ICT, the teacher replying, *"I'm just here to do my job, this is the subject (ICT), and I have to teach it, such as it is".* In addition, most students report delays in repairs, concerns over inadequacies in the headmasters' performance, and poor relationships between head teachers and teachers, **S[2]** saying, *"By the way, their relationship isn't good (teachers and headmasters), and we're the victims".*

5. The growing number of students and lack of building infrastructure

Another major issue found to affect the issue of ICT implementation is the growing number of students, which has caused many challenges regarding the capacity and size of classrooms originally designed before the introduction of the ICT programme. This has also lead to some schools not installing ICT tools in the classrooms due to a lack of space or safety concerns. **H[1]** summed this up clearly, *"Sometimes the ICT tools are much better off in the store room, nothing is more important to me than the safety of my students".* Some classrooms are extremely crowded, with 45 students on average, thus impeding teaching and learning, even without the issue of the installation of ICT tools. **T[1]** reported, *"We have classrooms with 45 students and the distance between the first row and the board is less than a meter; the situation is extremely difficult".*

This lack of space has previously been identified as a serious challenge. Computer labs without the facilities to connect ICT tools, the condition of the classrooms, as well as poor ventilation are continuous internal issues. There is an urgent need to upgrade the infrastructure to meet the needs of new technology and **S[3]** described the situation in his school, saying he cannot blame the teachers for their lack of engagement because, *"the computer lab's very old and there are very few computers".*

The lack of rooms to store resources means teachers often have to carry equipment wherever they go, and **T[4]** reported, *"I wish we had a resources room".* The buildings are also not equipped to accommodate the electrical requirements, and there are risks of error, so teachers have to take many precautions. Illustrating such challenges, **T[1]** commented, "*We're the only country in the world that uses electricity with 110 and 220 volts, and some devices require 110 volts, so when the teachers mistakenly use 220 volts with a device which needs 110 volts, it's bound to burn".* Issues of infrastructure that should be addressed include plugs, room size, ventilation as well as equipment, desks and chairs.

Due to the large number of students, all the participants acknowledged the lack of space as a major barrier, which makes it difficult to provide enough devices. **D[2]** stated this clearly, *"The problem is that some schools have no suitable space, for example, some schools need computer labs with 30 devices, but there's no space to add this number of devices".* This has affected the student computer ratio and **D[2]** commented, *"We've been forced to reduce the number to, for example, 15 devices, and the result is that 4 or 5 students have to work on one single computer".* All the headmasters report this challenge.

According to **H[1]**, keeping the ICT tools permanently in the store room is the best option rather than carrying them to class every day, as there is no space and it is not safe. He stated, *"I cannot provide ICT tools in the classroom, because, of the growing number of students so there's not enough space for ICT tools, and the classrooms are operating beyond their capacity".* Some schools have, in fact, no secure places, as **H[3]** stressed, *"We don't have anywhere for safekeeping after use".*

6. Workloads and time limitations

Constraints caused by workload and time were also identified. According to **T[1]**, " *I do have my own projector and I was bringing it with me, but, because I had to carry it all the time when I went to classrooms and plug it into my laptop, and so on, this took too much time. I wish I had a resources room; this would save a lot of time and effort.*" The large numbers of students and lack of space also affects the delivery of lessons. **T[3]** had previously used his projector and laptop for a smaller class, but he was no longer able to do this when given a larger class, which meant he could not use ICT, as he explains here, *"I have 24 teaching hours a week, and with the large number of students which I have now, it's impossible for me to find time for planning to use ICT in my teaching".*

5.3. Summary and Main Findings

The qualitative results from the perspectives of the directors of ICT, headmasters, teachers and students' interviews presented above revealed that the implementation of ICT in Saudi secondary schools is affected by many factors. Some are related to the Ministry of Education (external factors) and others related to the schools (internal factors).

The main findings drawn from the analysis of the interviews are summarised in light of the barriers/ factors that were found to make the implementation of ICT in Saudi schools more successful. Accordingly, the results of this chapter will be presented in two phases.

- ***Summary of phase* I *(school level)***

The majority of participants had positive views and attitudes towards integrating ICT in education, and stressed the necessity for the replacement of traditional teaching methods, which have become old fashioned, compared to e-learning methods. In addition, all headmasters reported that they are supporting teachers and students in the use of ICT in schools and they are making every effort to control and monitor the use of the internet at school.

However the results showed dissatisfaction about the current situation regarding ICT implementation.

The following section summarises the main barriers/factors that could affect ICT implementation in Saudi secondary schools, in particular, as follows:

- Growing number of students
- Negative of some student attitudes towards ICT.
- Lack of ICT tools
- Lack of understanding of the ICT policy
- Lack of teachers' skills, motivation, desire, confidence, experience,
- Lack of teachers ICT pedagogy, collaboration, employing ICT tools in the classroom, engagement in ICT training and resistance to change.
- Culture, religion and beliefs play role in some headmasters and teachers' behaviours and attitudes towards ICT.
- Lack of headmasters' supervision, assessment, encouragement and authority.
- Lack of space
- Lack of ICT infrastructure
- Lack of safety factors
- Lack of collaboration between staff.

- ***Summary of phase* II *(Government Level)***

- Lack of clarity in the education policy
- Lack of translation of ICT policy into action
- Lack of collaboration
- Lack of encouragement
- Lack of supervision and follow up
- Lack of training programmes (availability and quality).
- Lack of technical support.
- Lack of quality in the subject of ICT
- Lack of provision of ICT tools
- Lack of compatibility between the subject of ICT and most of the hardware and software
- Lack of financial resources
- Lack of school facilities
- Favouritism

- ***Phase* III *Challenges***

All the above factors (internal and external) are considered challenges if not treated.

Accordingly, The main findings of this chapter have enabled the study to establish clear

items in the headmasters', teachers' and students' questionnaire (see next chapter), which aims to identify the success factors for ICT implementation in the Saudi secondary school, by providing a clearer view of the current situation, taking into account the previous factors, alongside the remaining criteria in the study framework, all of which will help the study to develop a strategic approach that takes into consideration the barriers/ factors in Saudi secondary schools, in particular.

The table below summarises the main restrictions and barriers that could hinder the use of ICT in Saudi secondary schools, which were identified by study participants in this section.

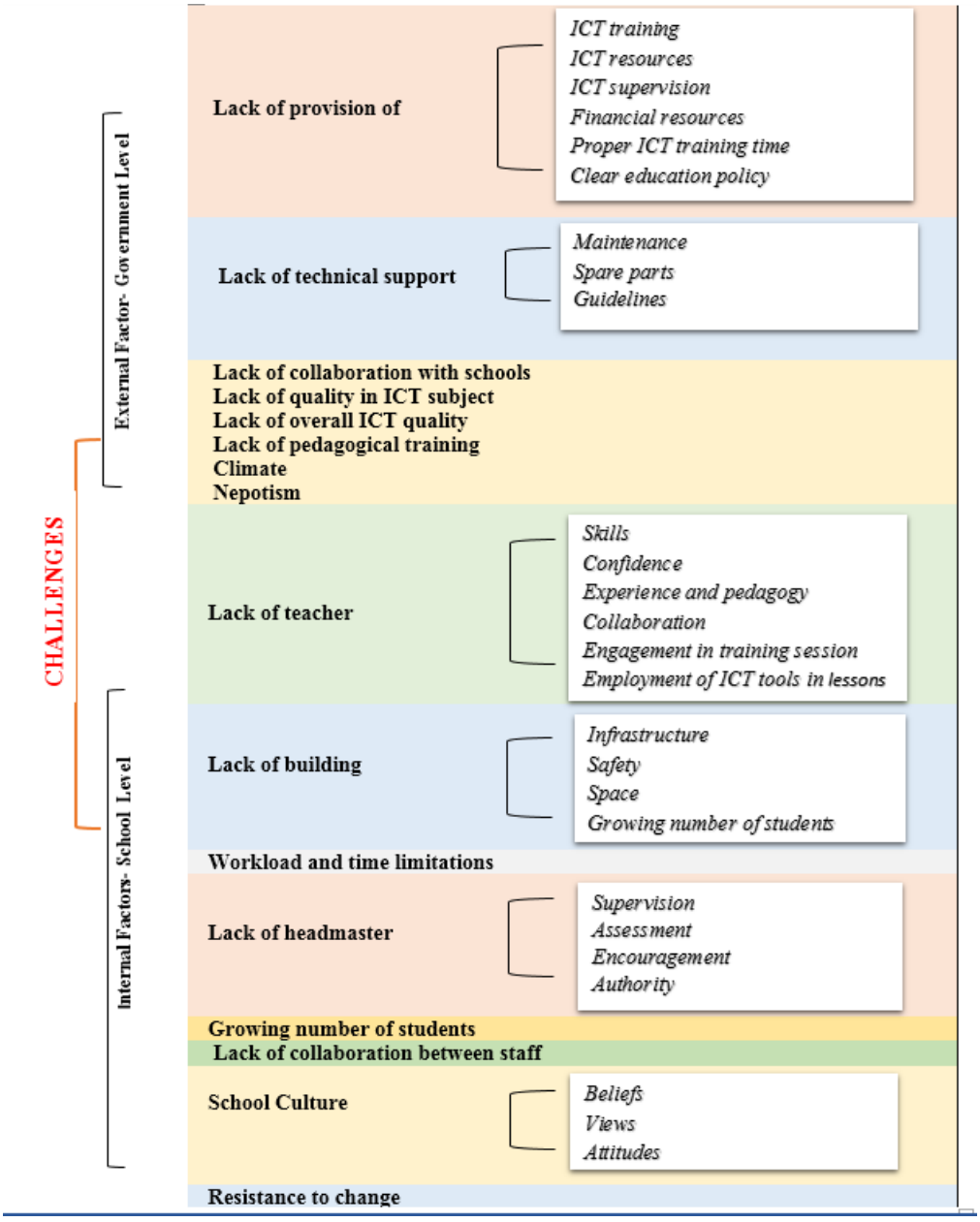


Table 5.3: Main barriers that could hinder ICT implementation in Saudi secondary schools

5.4. CONCLUSION

This chapter has established that ICT has great potential in improving learning and knowledge in the educational process. Although a great deal has been achieved regarding investment, the government has a long way to go in realising its planned programme. There is an evident lack of clarity in the education policy, the teachers are inadequately prepared, and the subject of ICT also remains weak and undeveloped. Coordination between the Ministry and the school is poor and there are insufficient resources, tools and technical teams to support the programme. The learning environment, teachers' skills and the availability of ICT tools, as well as the attitudes and views of the participants, with older teachers, in particular, resistant to change, have shaped its implementation. There is a need to address the barriers that affect the implementation at an organisational level by providing appropriate buildings and related ICT infrastructure, which could help to improve ICT implementation in a satisfactory way. There needs to be much more effective planning before implementation, with greatly improved supervision and follow up. At school level, the lack of teachers' skills has resulted in different views on the application of ICT in the classroom. There is a need to improve coordination between teachers and the headmaster, the learning environment and the perceptions about ICT. Implementing these suggestions will contribute enormously to the improvement of ICT use in Saudi Arabia schools.

There were many questions from the teachers about the framework of operation, and there needs to be clarity about this. There were also some misconceptions identified by teachers and some confusion in regard to e-learning and the application of ICT in the classroom. The need to establish training programmes on issues affecting the acceptance of ICT due to cultural barriers also needs to be explored in the framework. There is need, too, to refine the framework at all levels for head teachers, teachers, administrators, parents and, most importantly, for the Ministry of Education. The lack of ICT policy was also a major external challenge. In addition, there was a lack of processes and procedures or guidelines, and it was established that each headmaster and teacher interpreted such procedures differently.

Furthermore, most of the teachers' workloads prevented them from having the time to train, with more female than male teachers affected by this issue. Training time and places also require travel and teachers are not given time off to train In addition, some teachers are unwilling to attend training sessions, because they have no confidence in the trainers, who are reported to be self-trained. The lack of training also affects teachers' confidence in delivering ICT lessons, as well as shaping their attitudes towards ICT.

CHAPTER VI

QUANTITATIVE DATA ANALYSIS

6. INTRODUCTION

The qualitative analysis in Chapter five presented partial findings for the objectives of the research. Therefore, this chapter focuses, in depth, on participants' views about the factors that could make the implementation of ICT tools in Saudi secondary schools more effective and successful. Accordingly, this chapter aims to present the quantitative data results and interpretation of the main findings of the questionnaires, which were designed based on the study's theoretical framework created from the literature review, as well as findings generated from the interviews. Furthermore, this chapter provides a short description of the method of collecting quantitative data. At the end of this chapter, the conclusions drawn from the case studies are summarised and the main findings are presented. In addition, the overall study findings are presented in a comparison table (See chapter 7), in order to demonstrate the extent of agreement between evidence from the different data sources, which comprise both qualitative and quantitative data collection techniques.

Accordingly, this chapter is divided into two parts: the first part is descriptive analysis of data and the second is inferential statistics. The description of the data analysis in this chapter will be centered on the following points:

a) Views towards integration of ICT in education
b) The current ICT situation in Saudi secondary schools, which includes
    - ICT skills of school staff
    - ICT resources in schools
    - Level of ICT training
    - ICT in school functions
c) Degree of satisfaction with the current ICT situation
d) Headmasters' and teachers' roles and application in ICT tools in education.
e) Degree to which headmasters and teachers comply behaviorally with the tenets of Saudi ICT education policy.
f) Challenges that could hinder the use of ICT
g) The important factors that could make the implementation of ICT more successful.

6.1. THE QUESTIONNAIRES

Generally, the insights gained from the literature reviews and the interviews' help in the construction of the questionnaire i.e. the questionnaires were designed based on findings generated by previous research and after analysing the interviews in this study.

This study questionnaire is grouped into three closely related questionnaires, designed for: headmasters, teachers and students (See chapter 4 for further details).

- **The samples**

Questionnaires were distributed to a number of Jeddah secondary schools (boys and girls). In total 32 schools (16 boys' and 16 girls') were targeted to participate in this study. Within each school, one headmaster, four teachers as well as four students were asked to participate in the questionnaires. Overall, the total target number was 288 participants. 273 questionnaires were returned, while 230 were valid. As such, a response rate of 81.8% was achieved, which is an acceptable response rate according to Saunders et al. (2012) (See table 6.1). For further details see chapter 4, section 4.7.8.

Table 6.1 Questionnaire Sample

Participants	Male	Female	Distributed	Total Response			Response Rate
				Male	Female	Total	
Headmaster	16	16	32	14	14	28	87.5%
Teachers	64	64	128	50	52	102	79.6%
Students	64	64	128	50	50	102	78.1%
			288			230	81.8%

- **The Questionnaire design**

The questionnaires' statements have been categorised into eleven sections. Each section aims to achieve a particular aim or objective of the study. The headmasters' and teachers' questionnaires were similarly designed, however, one was contextualised for headmasters and the other was contextualised for teachers. The student questionnaire contains questions and scales enquiring about their experiences with ICT and is focused on their learning and school experience, hence it is different in a number of items to the teachers' and the headmasters' questionnaires. Each section in the questionnaires contains a number of items/questions all of which are answered on 5-point (Likert scales). Table 6.2 below presents a summary of each questionnaire section (See all questionnaires in Appendix 2a. b and c).

	Headmaster and Teacher Questionnaires					Student Questionnaires				
I	Personal and demographic questions Gender, age, educational experience and qualification and daily use of ICT					Personal and demographic questions Gender, access to personal computer and daily use of ICT				
II	Current availability and use of ICT tools					Current availability and use of ICT tools				
	Available with use at all times	Available with frequent use	Available with limited use	Available with no use at all	Unavailable	Available with use at all times	Available with frequent use	Available with limited use	Available with no use at all	Unavailable
III	Level of ICT skills					Level of ICT skills				
	Advanced	Good	Moderate	Poor	No skills	Advanced	Good	Moderate	Poor	No skills
IV	ICT application in headmaster functions					Application of ICT tools in school functions				
	Always	Often	Sometimes	Rarely	Never	Always	Often	Sometimes	Rarely	Never
V	Challenges facing ICT implementation					Challenges facing ICT implementation				
	S. Agree	Agree	Neutral	Disagree	S. Disagree	S. Agree	Agree	Neutral	Disagree	S. Disagree
VI	Perceptions in ICT in education					Attitudes and views in ICT				
	S. Agree	Agree	Neutral	Disagree	S. Disagree	S Agree	Agree	Neutral	Disagree	S. Disagree
VII	Views in ICT policy					Views regarding headmaster's role in ICT				
	S. Agree	Agree	Neutral	Disagree	S. Disagree	S. Agree	Agree	Neutral	Disagree	S. Disagree
VIII	Roles in ICT implementation					Views in ICT and ICT as a subject				
	Always	Often	Sometimes	Rarely	Never	Always	Often	Sometimes	Rarely	Never
IX	Level of ICT Training					Views towards teacher's role (in ICT)				
	Advanced	Good	Moderate	Poor	No Training	S. Agree	Agree	Neutral	Disagree	S. Disagree
X	Level of Satisfaction					Level of Satisfaction				
	Extremely Satisfied	Satisfied	Neither satisfied nor dissatisfied	Dissatisfied	Extremely Dissatisfied	Extremely Satisfied	Satisfied	Neither satisfied nor dissatisfied	Dissatisfied	Extremely Dissatisfied
XI	Success factors for ICT implementation					Success factors for ICT implementation				
	Not important at all	Very Important	Not important at all	Very Important	Not important at all	Very Important	Not important at all	Very important	Not important at all	Very important

Table 6.2: The survey designs

6.2. RESULTS

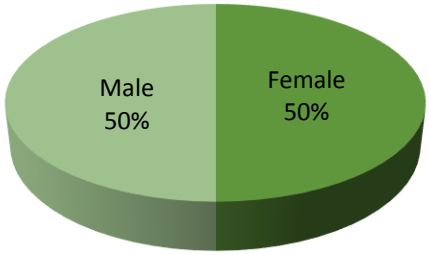
6.2.1 Headmasters' questionnaire

In this section, the study presents descriptive analysis corresponding with the quantitative data generated from Saudi secondary schools' headmasters.

- **Personal information**

Regarding the ***gender***, overall, 28 headmasters took part in this study with an equal number of males (14) and females (14). See figure 6.1.

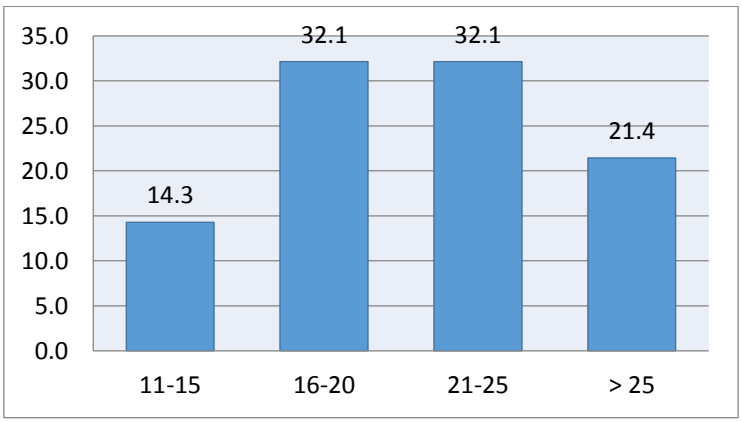
Figure 6.1: **Headmasters' Gender**



Participants' ***ages*** varied: three participants (10.7%) had an age between 36-40 years old; 10 had an age between 41-45 years old (35.7%); while 13 had an age between 46 and 50 years of age (46.4%). Finally two participants had an age between 51 and 55 years of age (7.1%).
By looking at their ***qualifications***, most of the headmasters (89.3%) had a bachelor's degree in different disciplines and only 10.7% had a diploma. No one registered other qualifications.

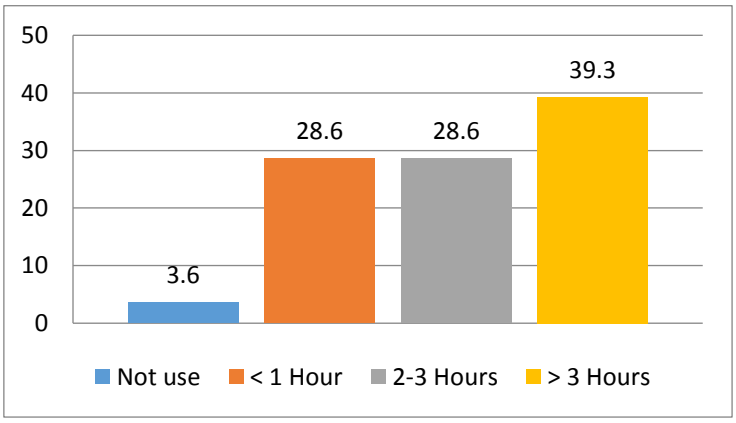
The results showed that the headmasters had different ***levels of experience*** in the education field (Figure 6.2). Four participants (14.3%) had 11-15 years of experience; 9 had 16-20 years of experience (32.1%) and similarly 9 had experience between 21 and 25 years of experience. Finally, six participants registered more than 25 years of experience (21.4%).

Figure 6.2: Participants' experience in the education field by percentage (%)



As for personal **use of ICT** on a daily basis (figure 6.3), it is evident that the majority of headmasters (39.3%) use ICT for more than three hours a day, while 28.6% use it two to three hours a day and equally 28.6% use it less than one hour a day. Finally 3.6% stated that they do not use ICT at all.

Figure 6.3: Participants' use of ICT on daily basis



- **Perceptions towards integration of ICT in education**

The perception of headmasters towards the use of ICT in education was assessed through 20 questions. All headmasters rated their level of agreement with statements presented (ranging from strongly agree to strongly disagree).

The most agreement was generated for the views that 'ICT has an important part to play in teaching and learning generally' and 'ICT has no effect unless there is the principle of reward and discipline,' both achieving the same average (M=1.25).

This was followed by another three items with similar mean scores, namely stating, 'I forbid the use of the internet in my school, because high school students are at a critical age,' and, 'I forbid the use of the internet because some students tend to use it outside the range of learning,' as well as, 'We need to prepare our schools to use ICT before starting to apply it,' all of which had exactly the same mean score (M=1.28) i.e. reflecting high agreement.

On the other hand, as can be seen in table 6.3, there is evidence that the highest disagreements were generated for 'Using ICT is a dull activity' (M=2.71), followed by 'ICT makes work easier' (M=3.00) and, lastly, 'Using ICT can save time and effort' (M=3.35).

Table 6.3: Headmasters' Perception in ICT in education, presented by Percentages, Mean and SD

Section F: Headmaster perception in ICT in education	S.A.	Agree	Neutral	Disagree	S.D.	Mean	S.D.
ICT has an important part to play in teaching and learning generally.	75%	25%	0.0%	0.0%	0.0%	1.25	0.44
ICT has no effect unless there is the principle of reward and discipline.	78.6%	17.9%	3.6%	0.0%	0.0%	1.25	0.51
I forbid the use of the internet in my school, because high school students are at a critical age.	71.4%	28.6%	0.0%	0.0%	0.0%	1.28	0.46
I forbid the use of the internet because some students tend to use it outside the range of learning.	78.6%	17.9%	0.0%	3.6%	0.0%	1.28	0.65
We need to prepare our schools to use ICT before starting to apply it.	71.4%	28.6%	0.0%	0.0%	0.0%	1.28	0.46
ICT increases cooperation between teachers and students.	75%	21.4%	0.0%	3.6%	0.0%	1.32	0.66
ICT improves student results.	75%	17.9%	0.0%	7.1%	0.0%	1.39	0.83
ICT improves teachers' and students' research skills.	67.9%	25%	7.1%	0.0%	0.0%	1.39	0.62
I am very interested in learning about ICT and use it in my job.	71.4%	17.9%	10.7%	0.0%	0.0%	1.39	0.68
We need to change the mind-sets of some students and teachers about the importance of ICT in teaching and learning.	64.3%	21.4%	10.7%	3.6%	0.0%	1.53	0.83
We need to train teachers before the introduction of technology so that it does not lose its importance.	60.7%	17.9%	10.7%	7.1%	3.6%	1.75	1.14
ICT makes teaching enjoyable, changes routine and keeps boredom at bay.	39.3%	39.3%	0.0%	17.9%	3.6%	1.85	0.84
Using ICT is just a waste of time.	50%	28.6%	0.0%	14.3%	7.1%	2	1.33
Traditional teaching and learning methods are better than teaching using ICT.	35.7%	46.4%	0.0%	10.7%	7.1%	2.07	1.21
I do not encourage the use of the internet in schools because it is contrary to our traditions and customs.	42.9%	25%	14.3%	3.6%	14.3%	2.21	1.42
The money spent on the ICT sector is not worth it.	28.6%	35.7%	10.7%	14.3%	10.7%	2.42	1.34
I think it is a religious duty, the internet should be banned in secondary schools.	39.3%	21.4%	10.7%	14.3%	14.3%	2.42	1.50
Using ICT is a dull activity.	14.3%	53.6%	0.0%	10.7%	21.4%	2.71	1.43
ICT makes work easier.	17.9%	25%	10.7%	32.1%	14.3%	3.00	1.38
Using ICT can save time and effort.	10.7%	14.3%	17.9%	42.9%	14.3%	3.35	1.22

Overall, it can be indicated from the table above that there is an overall positive perception among headmasters in ICT and its integration in education. However, the study found some negative views among some headmasters who believe that ICT does not help in saving time and it does not make the work easer, it is clear that some questions generated more agreement than others.

- **Level of ICT Training**

In this section, headmasters were required, across the 11 items, to state the level of training they have received in a number of ICT tools, on a scale ranging between advanced to no training. Overall, when ranking these items it was found that the basic computer skills (M=2.60) received the highest training, followed by Microsoft Word (M=3.10) and the use of emails (M=3.23).

At the bottom of the scale, it was observed that their ability to do 'Computer Maintenance' (M=4.14), the use of 'Projector/ Data show' (M=4.21) and the use of 'Interactive whiteboard' (M=4.57) received the lowest training (See table 6.4).

Table 6.4: Level of ICT training, presented by percentages, Mean and SD.

Level of ICT training in	Advanced	Good	Moderate	Poor	No Training	Mean	SD
Basic Computer skills	21.4%	35.7%	14.3%	17.9%	10.7%	2.60	1.31
Microsoft word	7.1%	32.1%	21.4%	21.4%	17.9%	3.10	1.25
E-mail	10.7%	25.0%	17.9%	14.3%	32.1%	3.32	1.44
PowerPoint	3.6%	25.0%	21.4%	7.1%	42.9%	3.60	1.37
Internet browsing	3.6%	25.0%	3.6%	28.6%	39.3%	3.75	1.32
Printing	0.0%	25.0%	3.6%	39.3%	32.1%	3.78	1.16
Scanning	0.0%	17.9%	3.6%	39.3%	39.3%	4.00	1.08
Website Design	0.0%	21.4%	7.1%	17.9%	53.6%	4.03	1.23
Computer Maintenance	0.0%	17.9%	10.7%	10.7%	60.7%	4.14	1.20
Projector/ Data show	0.0%	10.7%	14.3%	17.9%	57.1%	4.21	1.06
Interactive Whiteboard	0.0%	7.1%	7.1%	7.1%	78.6%	4.57	0.92

Although the best training is generated in basic computer skills and Microsoft Word, it can be seen from the above table and by looking at all mean scores that training in ICT among school headmasters is poor.

- **Current Availability and use of ICT Tools**

In order to examine the current situation, the headmasters were asked to rate the availability and the use of ICT software/hardware in the school. Using 14 items the headmasters stated that the access to computers (M=1.42) and the access to the internet for administrators (M=1.57), as well as printers (M=1.96), were the most available and used ICT tools. The least used ICT tool was the use of TV (M=3.71), followed by availability and use of TV and Video (M=3.75) and, lastly, the access to internet for students (M=4.14) (see table 6.5).

Table 6.5: Availability and use of ICT tools, presented by percentages, Mean and SD

Availability and use of ICT tools	Available with use at all times	Available with frequent use	Available with limited use	Available with no use at all	Un-available	Mean	SD
Access to computers	75.0%	14.3%	7.1%	0.0%	3.6%	1.42	0.92
Administrator access to internet	64.3%	25.0%	3.6%	3.6%	3.6%	1.57	0.99
Printer	57.1%	14.3%	14.3%	3.6%	10.7%	1.96	1.37
Computer lab	42.9%	32.1%	7.1%	0.0%	17.9%	2.17	1.46
Microsoft Word	24.9%	14.3%	14.3%	3.6%	25.0%	2.53	1.66
Scanner	32.1%	21.4%	14.3%	3.6%	28.6%	2.75	1.64
School website	21.4%	17.9%	39.3%	3.6%	17.9%	2.78	1.34
PowerPoint	21.4%	28.6%	21.4%	3.6%	25.0%	2.82	1.49
Teacher access to internet	35.7%	7.1%	21.4%	3.6%	32.1%	2.89	1.70
Projector/ data show	28.6%	17.9%	14.3%	14.3%	25.0%	2.89	1.59
Interactive whiteboard	17.9%	7.1%	28.6%	3.6%	42.9%	3.46	1.55
TV	17.9%	3.6%	21.4%	3.6%	53.6%	3.71	1.58
Video/ DVD player	10.7%	3.6%	28.6%	14.3%	42.9%	3.75	1.35
Student access to internet	3.6%	7.1%	21.4%	7.1%	60.7%	4.14	1.20

Overall, it can be said that some ICT tools are more available in the schools than others. This could be related to the misdistribution of ICT tools by the Ministry of Education which was triggered by the results from the interviews. By looking at the average scores it can be concluded that the majority of ICT tools are limited in their availability.

- **Headmasters' ICT skills**

In this section, using eight items, it was found that the best headmaster ICT skills were found for 'Using the internet for work duties' (M=2.57), followed by 'Electronic communication with staff and students' (M=2.67) and 'General computer skills' (M=2.70). The bottom three questions (less than moderate skills) were the use of 'PowerPoint application' (M=3.21), 'Teaching how to use ICT in classrooms' (M=3.42) and, lastly, 'Fixing computer problems and other ICT problems' (M=3.92) (See table 6.6).

Table 6.6: Level of ICT Skills, presented by percentages, Mean and SD.

Level of ICT Skills	Advanced	Good	Moderate	Poor	No skills	Mean	SD
Using the internet for work duties	3.6%	50.0%	32.1%	14.3%	0.0%	2.57	0.79
Electronic communication with staff and students	3.6%	50.0%	28.6%	10.7%	7.1%	2.67	0.98
General computer skills level	7.4%	22.2%	63.0%	7.4%	0.0%	2.70	0.72
Using Microsoft Word	7.1%	35.7%	32.1%	17.9%	7.1%	2.82	1.05
Electronic communication with the Ministry of Education	3.6%	32.1%	42.9%	14.3%	7.1%	2.89	0.95
Using PowerPoint	0.0%	25.0%	42.9%	17.9%	14.3%	3.21	0.99
Teaching how to use ICT in the classroom	3.6%	10.7%	46.4%	17.9%	21.4%	3.42	1.06
Fixing ICT problems other ICT problems	3.6%	7.1%	32.1%	7.1%	50.%	3.92	1.21

Judging based on the table above, clearly the majority of headmasters have a moderate or good ICT skill level overall, but not in fixing computers and other ICT problems.

- **The use of ICT in headmasters' school functions**

The application of ICT tools in school functions, according to the headmasters, was rated based on 13 items. Headmaster were asked to rate how often they apply such tools on a scale ranging between always and never. It was shown that the most applied ICT tools in headmasters' school functions are: 'Staff personal information records' (M=1.42), followed by 'Use e-mails' (M=1.78) and 'Communication with the Ministry of Education' (M=1.78).

On the other hand, it was shown that the least used function were 'Electronic communication with students and parents' (M=2.21), 'Electronic communication with staff' (M=2.60) and, finally, 'Using PowerPoint' (M=3.07).

Table 6.7: Level of ICT application in school functions, presented by Percentages, Mean and SD

ICT tools in school functions	Always	Often	Some-times	Rarely	Never	Mean	SD
Staff personal information records	64.3%	28.6%	7.1%	0.0%	0.0%	1.42	0.63
Using e-mail	39.3%	42.9%	17.9%	0.0%	0.0%	1.78	0.73
Communication with the Ministry of Education	50.0%	28.6%	14.3%	7.1%	0.0%	1.78	0.95
Student admission details	39.3%	42.9%	10.7%	7.1%	0.0%	1.85	0.89
Microsoft Word	46.4%	28.6%	17.9%	3.6%	3.6%	1.89	1.06
Teacher assessment	46.4%	32.1%	10.7%	0.0%	10.7%	1.96	1.26
Schemes of work	42.9%	32.1%	14.3%	3.6%	7.1%	2.00	1.18

Browsing the internet	39.3%	32.1%	14.3%	10.7%	3.6%	2.07	1.15
Staff responsibilities records	39.3%	39.3%	7.1%	0.0%	14.3%	2.10	1.34
School timetable	32.1%	35.7%	21.4%	3.6%	7.1%	2.17	1.15
Electronic communication with students and parents	25.0%	50.0%	10.7%	7.1%	7.1%	2.21	1.13
Electronic communication with staff	17.9%	39.3%	21.4%	7.1%	14.3%	2.60	1.28
PowerPoint	10.7%	17.9%	32.1%	32.1%	7.1%	3.07	1.11

Overall, it can be seen that there is good application of ICT tools in school functions, according to the headmasters, where some tools are used more than others. However, based on the mean scores, only the last two items generated an average above the middle point of M=2.5 indicating tools are less applied.

- **Satisfaction with ICT**

Headmasters were asked about their satisfaction with the current situation (with regards to ICT and related issues in their schools). Overall it is evident, based on table 6.8, that there is a high level of dissatisfaction. By using 12 items, it is clear here that most satisfaction was generated for headmasters' own role in ICT implementation (M=2.25), followed by their ICT skills (M=2.32) and the outcome of using ICT tools in education (M=2.92).

However, it should be noted that any items with mean score above the middle point of 2.5 is leaning towards dissatisfaction. More dissatisfaction was generated for ICT policy, goals and clarity (M=3.25), the current ICT situation (availability and use) (M=3.67) and ICT training (M=3.89).

Table 6.8: Participants' satisfaction with ICT

Participants' satisfaction with ICT	Extremely Satisfied	Satisfied	Neither	Dissatisfied	Extremely Dissatisfied	Mean	SD
Your role in ICT implementation	28.6%	42.9%	10.7%	10.7%	7.1%	2.25	1.20
Your ICT skills	25%	39.3%	21.4%	7.1%	7.1%	2.32	1.15
Outcome of using ICT tools in education	14.3%	25%	25%	25%	10.7%	2.92	1.24
Student attitudes in ICT	10.7%	28.6%	25%	21.4%	14.3%	3	1.24
Quality of ICT tools	7.1%	32.1%	17.9%	28.6%	14.3%	3.10	1.22
Ongoing development in the integration of ICT tools in your school	10.7%	21.4%	28.6%	25%	14.3%	3.10	1.22
Staff collaboration in ICT	3.6%	28.6%	28.6%	25%	14.3%	3.17	1.12
Internet service in your school	17.9%	14.3%	25%	14.3%	28.6%	3.21	1.47
Support and supervision from the Ministry of Education	14.3%	21.4%	14.3%	25%	25%	3.25	1.43
ICT policy (goals and clarity	3.6%	28.6%	17.9%	39.3%	10.7%	3.25	1.10
Current situation (availability and use of ICT tools) in your school	3.6%	21.4%	10.7%	32.1%	32.1%	3.67	1.24
ICT training	4.8%	5.9%	28.6%	21.4%	39.3%	3.89	1.06

By keeping the middle point of 2.5 in mind, it can be seen that there is more dissatisfaction than satisfaction with ICT in the educational environment, as observed in 10 of the items (out of 12) in the satisfaction scale.

- **Importance factors for ICT implementation**

Participants were provided with 11 items (important factors for successful ICT implementation) to rate their importance in education. Overall, the highest three items in terms of importance were: providing good training in ICT for school staff (M=1.07), the importance of the headmaster's role in ICT implementation (M=1.10) and the importance of the teachers' role (M=1.10). On the other hand, of the scale, the least important factors were: the importance of the supervision of the Ministry of Education (M=1.67), the importance of self- belief and motivation in using ICT (M=1.82) and, finally, the importance of changing some misconceptions about using the internet in schools (M=2.25).

Table 6.9: Important ICT factors

Important ICT factors	Very Important	Important	Neither	Not Important	Not important at all	Mean	S.D.
Good ICT training for school staff	92.9%	7.1%	0.0%	0.0%	0.0%	1.07	0.26
Headmaster's role in ICT implementation	89.3%	10.7%	0.0%	0.0%	0.0%	1.10	0.31
Teacher's role in ICT implementation	89.3%	10.7%	0.0%	0.0%	0.0%	1.10	0.31
Sufficient number of ICT resources	85.7%	14.3%	0.0%	0.0%	0.0%	1.14	0.35
Technical support and maintenance	75%	25%	0.0%	0.0%	0.0%	1.25	0.44
Appropriate buildings and infrastructure	75%	21.4%	3.6%	0.0%	0.00%	1.32	0.66
Incentives and encouragement	71.4%	21.4%	7.1%	0.0%	0.0%	1.35	0.62
Clear ICT policy	67.9%	21.4%	3.6%	7.1%	0.0%	1.5	0.88
Supervision from the Ministry	46.4%	46.4%	0.0%	7.2%	0.0%	1.6	0.81
Self-belief and	46.4%	32.1%	14.3%	7.1%	0.0%	1.82	0.94
Changing misconceptions about Internet	46.4%	10.7%	21.4%	14.3%	7.1%	2.25	1.37

Overall, it can be judged that all items are very important, as clearly reflected by the average scores as well as the percentages in each of the items (more agreement compared to disagreement).

- **Headmasters' role in ICT implementation**

In this section, the headmasters were asked about their role and responsibilities in the implementation of ICT. They were asked, using 20 items, how often they carry out tasks that enhance the implementation of ICT tools in their schools. It was found that the most important element for implementing ICT (in their view) was to, 'try to make the classroom environment more enjoyable by integrating technology in all areas of education' (M=1.64). This was followed by their view that 'I am keen to make every ICT resource available at my school' (M=1.67). Furthermore, they showed that they 'encourage teachers to use ICT' (M=1.70) and that they are 'keen to ensure the maintenance and repair of ICT devices' (M=1.78).

The least important element in ICT implementation was the view that 'I'm keen to adhere to safety requirements for students and teachers when they use ICT devices' (M=2.07), followed

by them stating that they 'follow up student and teacher complaints about issues they face through the use of ICT tools and work to resolve them' (M=2.11), that they 'encourage students and teachers to use the internet throughout the whole of the school day' (M=2.21), 'I apply the principle of reward and discipline to teachers regarding ICT implementation' (M=2.48) and, finally, the least followed view that 'It is not my responsibility to apply the ICT policy, it is the supervisors from the Ministry of Education who are responsible' (M=2.92).

Table 6.10: Headmaster's Role in ICT implementation, presented by Percentages, Mean and SD

Headmaster's role in ICT implementation	Always	Often	Some-Times	Rarely	Never	Mean	SD
I try to make the classroom environment more enjoyable by integrating technology in all areas of education.	46.4%	46.4%	3.6%	3.6%	0.0%	1.64	0.73
I am keen to provide every ICT resource to be available at my school.	42.9%	50%	3.6%	3.6%	0.0%	1.67	0.72
I encourage my teachers to use ICT.	51.9%	29.6%	14.8%	3.7%	0.0%	1.70	0.86
I'm keen to ensure the maintenance and repair of ICT devices.	39.3%	50%	7.1%	0.0%	3.6%	1.78	0.87
I show my teachers all the circulars regarding the importance of using ICT in teaching and ask them to sign the circulars as evidence that they have been viewed.	48.1%	29.6%	14.8%	7.4%	0.0%	1.81	0.96
One of my duties in assessing the work of teachers is evaluating how they employ ICT in their lessons.	35.7%	50%	10.7%	3.6%	0.0%	1.82	0.77
I'm keen for all my teachers to use ICT tools in all lessons.	39.3%	42.9%	14.3%	3.6%	0.0%	1.82	0.81
I ask teachers to involve students in the use of ICT tools in lessons.	42.9%	42.9%	7.1%	3.6%	3.6%	1.82	0.98
I'm keen to provide an appropriate place to store ICT devices.	33.3%	58.3%	4.2%	0.0%	4.2%	1.83	0.86
I always ask teachers and students to pay attention to safety issues when using ICT devices.	32.1%	50%	14.3%	3.6%	0.0%	1.89	0.78
I involve the Department of Education in solving problems related to lack of, or damage, to equipment.	28%	52%	20%	0.0%	0.0%	1.92	0.70
I aim keen to provide training courses for my teachers.	35.7%	39.3%	21.4%	3.6%	0.0%	1.92	0.85
I always explain to my teachers the importance of ICT tools in educational processes.	39.3%	39.3%	14.3%	3.6%	3.6%	1.92	1.01
I encourage teachers to attend ICT training courses.	35.7%	32.1%	32.1%	0.0%	0.0%	1.96	0.83
I'm keen to keep the computer lab open to students and teachers at all times.	35.7%	42.9%	10.7%	0.0%	10.7%	2.07	1.21
I'm keen to adhere to safety requirements for students and teachers when they use ICT devices.	21.4%	53.6%	21.4%	3.6%	0.0%	2.07	0.76
I follow up student and teacher complaints about issues they face through the use of ICT tools and work to resolve them.	29.6%	33.3%	33.3%	3.7%	0.0%	2.11	0.89
I encourage students and teachers to use the internet throughout the whole of the school day.	25%	39.3%	25%	10.7%	0.0%	2.21	0.95
I apply the principle of reward and discipline to teachers regarding ICT implementation.	22.2%	25.9%	40.7%	3.7	7.4%	2.48	l.122
It is not my responsibility to apply the ICT policy, it is the supervisors from the Ministry of Education who are responsible.	32.1%	3.6%	25%	17.9	21.4%	2.92	1.56

Overall, it should be noted, from table 6.8, that the majority of the steps taken for the implementation of ICT in schools by the headmasters were carried out and they showed positive scores across most items**.**

- ***Degree of understanding and applying ICT policy***

Using 13 items, the view and understanding of the educational ICT policy was assessed among schools' headmasters. To achieve this, the items were ranked based on level of agreement. The highest agreement item was 'there is a weakness in explaining ICT policy and its goals in education' (M=1.89). They also agreed that 'The Ministry of Education has not developed clear goals and instructions on ICT implementation' (M=1.96), as well as, 'The ICT policy is just theory and has not been applied in practice.' (M=2.25).

On the other hand, the least agreement was generated for the views that 'The Ministry of Education is keen to raise the awareness of teachers about the importance of ICT' (M=3.28) and 'The ICT policy has a positive effect on headmasters attitudes towards their use' (M=3.75) and, finally, 'I do not need to know about the ICT policy because nobody is likely to ask me about it.' (M=3.89). (See table 6.11).

Table 6.11: Views in ICT policy, presented by Percentages, Mean and SD

View and understanding ICT policy	S.A.	Agree	Neutral	Disagree	S.D.	Mean	SD
There is a weakness in explaining ICT policy and its goals in education.	35.7%	46.4%	10.7%	7.1%	0.0%	1.89	0.87
The Ministry of Education has not developed clear goals and instructions on ICT implementation.	35.7%	42.9%	10.7%	10.7%	0.0%	1.96	0.96
The ICT policy is just theory and has not been applied in practice.	10.7%	60.7%	21.4%	7.1%	0.0%	2.25	0.75
The ICT policy is not clear.	28.6%	17.9%	39.3%	14.3%	0.0%	2.39	1.06
It is the duty of the Ministry of Education to educate teachers in advance about the education policy.	7.1%	42.9%	42.9%	7.1%	0.0%	2.5	0.74
I receive and support from the Ministry of Education when I use ICT in my school	14.3%	28.6%	32.1%	17.9%	7.1%	2.75	1.14
I pay little attention to ICT in my school due to the lack of clarity in the current policy.	21.4%	28.6%	21.4%	7.1%	21.4%	2.78	1.44
It is not my business to implement the ICT policy; it is the role of the headmaster.	3.6%	46.4%	17.9%	25%	7.1%	2.85	1.07
I have no idea about the ICT policy.	3.6%	21.4%	53.6%	14.3%	7.1%	3	0.90
Frankly, I haven't heard of the Ministry of Education's policy.	0.0%	35.7%	28.6%	25%	10.7%	3.10	1.03
The Ministry of Education is keen to raise the awareness of teachers about the importance of ICT.	3.6%	25%	32.1%	17.9%	21.4%	3.28	1.18
The ICT policy has a positive effect on my attitude towards their use.	0.0%	10.7%	32.1%	28.6%	28.6%	3.75	1.00
I do not need to know about the ICT policy because nobody is likely to ask me about it.	0.0%	3.6%	25%	50%	21.4%	3.89	0.78

Overall, it can be judged based on the table above that most items reflect agreement with negative views about the ICT policy. Most questions have more agreement compared to disagreement.

- **Challenges facing ICT implementation**

Headmasters were asked to rate their agreement (ranging from strongly agree to strongly disagree) with 28 challenges facing the implementation of ICT in schools. According to their responses, the challenges most agreed upon are the 'growing number of students' (M=1.21),

followed by the ‘Lack of supervision from the Ministry of Education’ (M=1.35), the ‘Lack of ICT tools’ (M=1.50), ‘Lack of ICT training programmes’ (M=1.53) and ‘Lack of technical support’ (M=1.57). The interesting point is the ‘important role of favouritism in the unequal distribution of ICT equipment to schools (M=1.60).

The least agreement was generated for ‘Teachers' negative attitudes’ (M=2.60), followed by ‘Lack of the headmaster’s supervision’ (M=2.65), then ‘lack of confidence in the ability to use ICT’ (M=2.78) and, lastly, ‘traditions and beliefs’ (M=2.82) (See table 6.12).

Table 6.12: Challenges hindering the use of ICT in school

Challenges	S.A.	Agree	Neutral	Disagree	S.D.	Mean	SD
Growing number of students	78.6%	21.4%	0.0%	0.0%	0.0%	1.21	0.41
Lack of supervision from the Ministry of Education	64.3%	35.7%	0.0%	0.0%	0.0%	1.35	0.48
Lack of ICT tolls	57.1%	39.3%	3.6%	0.0%	0.0%	1.50	0.69
Lack of ICT training programmes	53.6%	39.3%	7.1%	0.0%	0.0%	1.53	0.63
Lack of technical support	57.1%	32.1%	7.1%	3.6%	0.0%	1.57	0.79
Important role of favouritism in the unequal distribution of ICT equipment to schools	57.1%	32.1%	7.1%	0.0%	3.6%	1.60	0.91
Lack of teacher awareness about the importance of ICT in educational pedagogy	46.4%	39.3%	10.7%	3.6%	0.0%	1.71	0.80
Lack of financial resources	53.6%	32.1%	3.6%	3.6%	7.1%	1.78	1.16
Students' negative attitudes	35.7%	42.9%	17.9%	3.6%	0.0%	1.89	0.83
Lack of time available to use it	39.3%	32.1%	14.3%	14.3%	0.0%	2.03	1.07
No, or slow, internet access	32.1%	53.6%	3.6%	0.0%	10.7%	2.03	1.17
Lack of suitable infrastructure	42.9%	28.6%	14.3%	10.7%	3.6%	2.03	1.17
Lack of maintenance	25.0%	50.0%	17.9%	7.1%	0.0%	2.07	0.85
Lack of appropriate space to use	25.0%	50.0%	17.9%	3.6%	3.6%	2.10	0.95
Lack of storage space to keep it	35.7%	35.7%	14.3%	7.1%	7.1%	2.14	1.20
Lack of time for training	22.2%	44.4%	25.9%	7.4%	0.0%	2.18	0.87
Scheduling problems	17.9%	53.6%	17.9%	7.1%	3.6%	2.25	0.96
Lack of understanding of ICT policy	32.1%	25.0%	28.6%	14.3%	0.0%	2.25	1.07
Lack of teacher experience/ skills in ICT	32.1%	35.7%	7.1%	21.4%	3.6%	2.28	1.24
Lack of teacher collaboration	17.9%	42.9%	21.4%	17.9%	0.0%	2.39	0.99
The effect of climate on efficiency and performance of devices	25.0%	17.9%	46.4%	7.1%	3.6%	2.46	1.07
Lack of classroom management skills	14.3%	57.1%	10.7%	3.6%	14.3%	2.46	1.23
Lack of incentives and motivation	25.0%	35.7%	21.4%	0.0%	17.9%	2.50	1.37
Teacher resistance to change	17.9%	32.1%	28.6%	17.9%	3.6%	2.57	1.10
Teachers' negative attitudes	17.9%	35.7%	21.4%	17.9%	7.1%	2.60	1.19
Lack of headmaster supervision	18.2%	28.3%	26.3%	24.2%	3.0%	2.65	1.12
Lack of confidence in the ability to use ICT	14.3%	28.6%	25.0%	28.6%	3.6%	2.78	1.13
Traditions and beliefs	28.6%	17.9%	10.7%	28.6%	14.3%	2.82	1.49

It should be noted that headmasters agreed on most of the challenges. Hence that reflects that all challenges included here (Table 6.10) are crucial in the use of ICT in schools, according to the headmasters. It is safe to assume that only four items (last in the table) have an average above the point of 2.5, hence indicating that these are the least important challenges in ICT implementation in the schools.

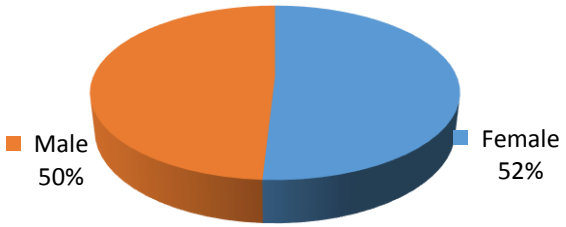
6.2.2: Teachers' Questionnaire

Similar to the previous section (headmasters' questionnaire), the following sections correspond with the quantitative data generated from Saudi secondary schools' teachers.

- ***Personal information***

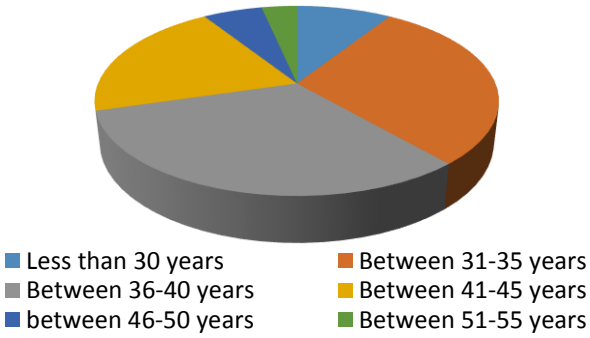
Regarding ***gender***, in total, 102 teachers took part in this survey with similar numbers of males (50) and females (52) (see figure 6.4).

Figure 6.4: Teachers' Gender



Regarding ***teachers' age,*** 8.3% had an age of less than 30 years old, 27.1% of the participants were aged between 31-35 years old, 29.2% aged between 36-40 years old, 18.8% aged between 41-45 years, 8.3% aged between 46-50 years, 5.2% had an age between 51-55 years old and, lastly, 3.1% had an age category of 56-60 years old. It can be observed that more the 80% of teachers were between 30-45 years old, which means they are young. Figure 6.5.

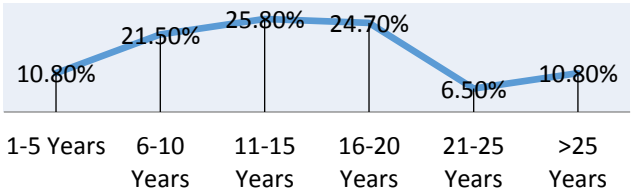
Figure 6.5: Teachers' age



Regarding the teachers' ***qualifications***, most teachers (87.9%) had a bachelor's degree in different disciplines, while 11% had Master degree and only one teacher (1.1%) had a diploma.

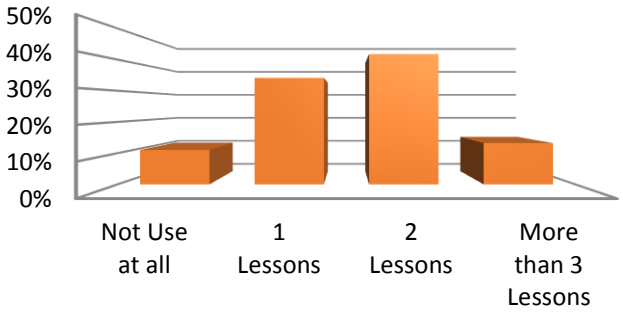
Teachers had different levels of teaching ***experience.*** 25.8% had experience of between 11-15 years, while 24.7% had experience between 16-20 years (Figure 6.6).

Figure 6.6: Teachers' experience in education reflected in percentages



The level of daily use of ICT in the school, represented in Figure 6.7, shows that the majority (41.8%) use ICT between 2-3 lessons per day, 34.1% use it in less than one lesson and only 13.2% use ICT in more than three lessons a day. Finally, it can be observed that almost all teachers (75%) are using ICT tools on school days, between one and two lessons out of eight lessons per day.

Figure 6.7: Teachers' daily use of ICT in schools according to lesson sessions



	Not Use at all	1 Lessons	2 Lessons	More than 3 Lessons
Series1	11%	34.10%	41.80%	13.20%

- **Teachers' perceptions of ICT in education**

The teachers' views and perspectives on ICT in education were assessed through 20 items. All teachers rated their level of agreement with items presented (ranging from strongly agree to strongly disagree). In doing so, it was evident that 'the need to prepare schools for ICT before starting to apply it' received the highest agreement (M=1.31). It was also agreed that 'ICT makes teaching enjoyable, changes routine and keeps boredom at bay' (M=1.45). Teachers also agreed that 'ICT makes their work easier' (M=1.48).

The lowest ranked items, on the other hand, in terms of highest agreement, were 'the money spent in the ICT sector is not worth it' (M=2.31), followed by the statement 'using ICT is a dull activity' (M=2.52) and 'teachers prevent students from using the internet because some students tend to use it outside the range of learning activities' (M=2.92).

Table 6.13: Teachers' perceptions in ICT in education, presented in Percentages, Mean and SD

Teachers' perspectives in ICT in education	S.A.	Agree	Neutral	Disagree	S.D	Mean	SD
We need to prepare schools for ICT before starting to apply it.	78.2%	17.8%	1%	0.0%	3%	1.31	0.77
ICT makes teaching enjoyable, changes routine	58.4%	39.6%	1%	0.0%	1%	1.45	0.62
ICT makes our work easier.	59%	36%	4%	0.0%	1%	1.48	0.67
Using ICT can save time and effort.	58.4%	34.7%	5%	1%	1%	1.51	0.72
We need to train teachers before the introduction of technology so that it does not lose its importance.	70%	19%	3%	3%	5%	1.54	1.04
ICT increases cooperation between teachers and students.	53.5%	40.6%	4%	1.0%	1%	1.55	0.71
I'm very interested in learning about ICT and use it in my lessons.	59.8%	32.4%	3.9%	0.0%	3.9%	1.55	0.89
ICT improves teachers' and students' research skills.	55%	39%	3%	0.0%	3%	1.57	0.81
ICT has an important part to play in teaching and learning generally.	55.4%	33.7%	7.9%	2.0%	1%	1.59	0.80
ICT improves student results.	51%	31.4%	16.7%	0.0%	1%	1.68	0.82
We need to change the beliefs of some students and teachers about the importance of ICT in education	45.1%	32.4%	11.8%	4.9%	5.9%	1.94	1.14
There is no effective use of ICT unless there is the principle of reward and discipline.	52%	21.6%	12.7%	7.8%	5.9%	1.94	1.22
I think it is a religious duty to ban the internet in secondary schools.	44.6%	29.7%	10.9%	7.9%	6.9%	2.02	1.22
Using ICT is just a waste of time.	38.2%	37.3%	6.9%	9.8%	7.8%	2.11	1.24
I forbid the use of the internet in my lessons, because high school students are at a critical age.	38.2%	30.4%	10.8%	9.8%	10.8 %	2.24	1.34
Traditional teaching and learning methods are better than teaching using ICT.	28.7%	39.4%	13.8%	11.7%	6.4	2.27	1.18
I do not encourage the use of the internet in schools because it is contrary to our traditions and customs.	34.7%	31.7%	15.8%	5.9%	11.9	2.28	1.32
The money spent in the ICT sector is not worth it.	39.6%	29.7%	7.9%	5.0%	17.8	2.31	1.48
Using ICT is a dull activity.	17.8%	47.5%	12.9%	7.9%	13.9	2.52	1.26
I prevent students from using the internet because some students tend to use it outside the range of learning activities.	15.8%	28.7%	18.8%	20.8%	15.8	2.92	1.33

By looking at the scale above, it is clear that there is more agreement than disagreement across all items, reflecting the importance of ICT and the way participants' view it in an educational setting.

- **Teachers' ICT skills (qualifications)**

This section deals with teachers' ICT skills. Using eight items, the skills were rated from advanced skills to no skills. It was found that ability in 'Working using the internet' received the best ratings of teachers' skills (M=2.28), followed by 'Basic computer skills' (M=2.32) and the use of Microsoft Word (M=2.48).

However, it was found that teachers have poor skills in 'Using Projector' (M=3.32), 'Using Interactive Whiteboard' (M=3.32) and the ability to 'fix some computer problems and other ICT devices' (M=3.76) (See table 6.14).

Table 6.14: Teachers' ICT skills presented in Percentages, Mean and SD

Teachers' ICT skills	Advanced	Good	Moderate	Poor	No skills	Mean	SD
Working using the internet	21.4%	35.7%	36.7%	5.1%	1.0%	2.28	0.89
Basic computer skills	18.0%	46.0%	25.0%	8.0%	3.0%	2.32	0.96
Using Microsoft Word	18.8%	33.7%	33.7%	7.9%	5.9%	2.48	1.07
Electronic Communicating with staff/ students	15.8%	31.7%	38.6%	13.9%	0.0%	2.50	0.92
Electronic communication with the Ministry	8.2%	14.4%	36.1%	26.8%	14.4%	3.24	1.12
Using Projector	6.0%	22.0%	28.0%	22.0%	22.0%	3.32	1.21
Using Interactive Whiteboard	8.9%	13.9%	31.7%	26.7%	18.%	3.32	1.19
Fixing computer problems and other ICT devices	6.1%	12.1%	20.2%	22.2%	39.4%	3.76	1.26

Teachers' ICT skills are varying, however, by looking at the table above it can be assumed that most teachers are unskilled in some important and popular ICT tools in education (e.g. interactive whiteboard and projector). Overall, four tools generated average scores below 2.5, reflecting better skill, and four tools generated an average above 2.5, reflecting poorer skills.

- **The current ICT situation Tools (Availability and use)**

In this section, using 13 items, teachers were asked to state the availability of ICT tools and the extent to which they are used. This was evaluated with responses ranging from 'available with use at all times' to 'not available at all'. In doing so, it was observed that the most available with use was 'access to Computers' (M=2.13), followed by 'PowerPoint' (M=2.53) and 'Computer Lap' (M=2.62).

The less available and used items were 'Scanner' (M=3.47), 'TV' (M=3.67) and 'Student access to internet' (M=3.86) (See table 6.15).

Table 6.15: Current availability and use of ICT, presented in Percentages, Mean and SD

Current situation (availability and use of ICT)	Available with use at all times	Available with frequent use	Available with limited use	Available with no use at all	Not available at all	Mean	SD
Access to computers	48.5%	20.8%	10.9%	7.9%	11.9%	2.13	1.40
PowerPoint	13.9%	13.9%	12.9%	5.9%	53.5%	2.53	1.58
Computer's lap	35.4%	18.8%	12.5%	14.6%	18.8%	2.62	1.54
Microsoft Word	39.6%	17.8%	13.9%	6.9%	21.8%	2.72	1.61
Printer	19.0%	27.0%	29.0%	8.0%	17.0%	2.77	1.32
School website	17.6%	14.7%	21.6%	8.8%	37.3%	2.89	1.45
Projector/Data show	30.9%	11.3%	8.2%	5.2%	44.3%	2.97	1.65
Teacher access to internet	18.8%	19.8%	20.8%	7.3%	33.3%	3.16	1.53
Interactive whiteboard	10.8%	19.6%	13.7%	7.8%	48.0%	3.20	1.77
DVD/educational CDs	28.7%	16.8%	13.9%	9.9%	30.7%	3.33	1.53
Scanner	57.1%	14.3%	14.3%	3.6%	10.7%	3.47	1.51
TV	19.8%	16.8%	5.9%	7.9%	49.5%	3.76	1.56
Student access to internet	10.4%	13.5%	11.5%	8.3%	56.3%	3.86	1.46

The table above reflects that, overall, the availability of ICT tools is not sufficient. Clearly all items apart from access to a computer generated an average above 2.5, leading to the understanding that there is poor availability for all items apart from access to a computer.

- **Level of ICT Training**

Teachers were asked about the level of training they have received in 11 programmes or skills associated with ICT. Table 6.16 below shows the frequency of their scores based on a 5-point Likert scale (advanced to no training) along with their Mean score, Standard Deviation and the Rank of each item. The results showed that, generally, across the majority of items the training they have received is considered less than moderate. Basic computer skills showed the best average (M=2.70), followed by Microsoft Word (M=2.78) and Power Point (M=3.06).

On the other hand, the poorest training was received in 'Using interactive whiteboard' (M=3.69), 'Using Project/Data Show' (M=3.94) and, lastly. 'Computer Maintenance' (M=4.30).

Table 6.16: Teachers' level of training presented in Percentages, Mean and SD

Teachers' level of ICT training	Advanced	Good	Moderate	Poor	No Training	Mean	SD
Basic computer skills	21.4%	29.6%	18.4%	18.4%	12.2%	2.70	1.32
Microsoft Word	21.4%	29.6%	16.3%	14.3%	18.4%	2.78	1.41
PowerPoint	15.5%	23.7%	21.6%	17.5%	21.6%	3.06	1.38
Email	13.9%	11.9%	11.9%	32.7%	29.7%	3.52	1.38
Webdesign	13.9%	5.0%	7.9%	15.8%	57.4%	3.98	1.45
Internet access	8.1%	15.2%	11.1%	40.4%	25.3%	3.59	1.24
Printing	7.0%	14.0%	8.0%	38.0%	33.0%	3.76	1.24
Scanning	7.0%	9.0%	7.0%	38.0%	39.0%	3.93	1.20
Interactive whiteboard	12.9%	8.9%	21.8%	8.9%	47.5%	3.69	1.46
Projector/ Data show	7.0%	8.0%	14.0%	26.0%	45.0%	3.94	1.24
Computer maintenance	6.2%	6.2%	9.3%	7.2%	71.1%	4.30	1.23

Again, by determining an average score above 2.5, it is clear that teachers had poor training in all ICT tools, all of which have an average score leaning towards poor and no training.

- **Application of ICT in teachers' school functions**

In this section, teachers were asked about the way they use ICT tools in their preparation at school. In doing so, they were given 13 related items and were asked about how often they used ICT for given tasks. It was found that the use of computers to write student's exam papers/questions was most used by teachers (M=1.38), followed by the use of computers to prepare lessons (M=1.99) and, thirdly, use of Microsoft Word (M=2.01).

Teachers showed that the least used items were 'using an attractive whiteboard in my lessons' (M=3.46), .the use of a projector in lessons' (M=3.83) and, finally, 'communicating with students and parents electronically' (M=3.84).

Table 6.17: Application of ICT in school functions, explained by Percentages, Mean and SD

Functions	Always	Often	Some-times	Rarely	Never	Mean	SD
I use the computer to write student exam questions.	67.3%	28.6%	2.0%	2.0%	0.0%	1.38	0.63
I use the computer to prepare my lessons.	39.0%	35.0%	16.0%	8.0%	2.0%	1.99	1.02
I use Microsoft Word.	40.0%	30.0%	21.0%	7.0%	2.0%	2.01	1.03
I communicate with administration electronically.	39.2%	32.0%	19.6%	6.2%	3.1%	2.0	1.06
I use the internet to prepare my lessons.	37.8%	31.6%	8.2%	12.2%	10.2%	2.25	1.34
I use PowerPoint.	26.0%	33.0%	28.0%	10.0%	3.0%	2.31	1.06
I use the computer in student progress reports.	35.0%	25.0%	18.0%	6.0%	16.0%	2.43	1.43
I use email in my work.	19.4%	23.5%	18.4%	18.4%	20.4%	2.96	1.42
I communicate electronically with the Ministry of Education.	14.3%	13.3%	30.6%	15.3%	26.5%	3.26	1.36
I design educational programs for my classes.	6.1%	27.6%	20.4%	18.4%	27.6%	3.33	1.30
I use an attractive whiteboard in my lessons.	13.0%	17.0%	22.0%	7.0%	41.0%	3.46	1.48
I use a projector in my lessons.	6.2%	14.4%	13.4%	21.6%	44.3%	3.83	1.30
I communicate with students and parents electronically.	8.9%	11.9%	12.9%	18.8%	47.5%	3.84	1.36

The application of ICT in teaching functions among teachers seems to be poor overall; most items had answers leaning towards low use.

- **Satisfaction**

Teachers' satisfaction with ICT overall was judged based on 12 items, using the average score of a five point satisfaction scale. It is evident that teachers' role in ICT implementation gained most satisfaction (M=2.54), followed by the attitude of students in ICT (M=2.81) and the outcome of using ICT tools in education (M=2.88). On the other hand, the scale with high dissatisfaction were generated for support and supervision from the Ministry of Education (M=3.35), training in ICT (M=3.39) and, finally, the internet service at the school (M=3.75).

Table 6.18: Satisfaction with the current ICT situation in school

Satisfaction	Extremely Satisfied	Satisfied	Neither	Dissatisfied	Extremely Dissatisfied	Mean	SD
Your role in ICT implementation	16.7%	32.4%	34.3%	12.7%	3.9%	2.54	1.04
The attitude of students in ICT	17.6%	30.4%	18.6%	19.6%	13.7%	2.81	1.31
Outcome of using ICT tools	13.7%	22.5%	33.3%	22.5%	7.8%	2.88	1.14
Quality of ICT tools	7.8%	29.4%	30.4%	23.5%	8.8%	2.96	1.09
Your ICT skills	13.7%	23.5%	27.5%	22.5%	12.7%	2.97	1.23
The current situation	9.8%	21.6%	23.5%	28.4%	16.7%	3.20	1.23
ICT policy (goals and clarity)	5.9%	23.5%	28.4%	25.5%	16.7%	3.23	1.16
Collaboration between staff	9.8%	19.6%	25.5%	26.5%	18.6%	3.24	1.24
Ongoing development in the integration of ICT tools in your school	4.9%	21.6%	29.4%	22.5%	21.6%	3.34	1.18
Support and supervision from the Ministry of Education	6.9%	21.6%	24.5%	23.5%	23.5%	3.35	1.24
ICT training	3.9%	22.5%	25.5%	26.5%	21.6%	3.39	1.17
The internet service in your school	3.9%	16.7%	16.7%	25.5%	37.3%	3.75	1.23

Clearly, there is overall dissatisfaction with the current situation with regard to ICT and related issues among teachers. This is reflected by the percentages and the overall average of each of the items.

- **Important factors for ICT implementation**

The important factors in successful ICT implementation were tested using 11 items. Teachers clearly saw that most items bare importance. Providing good training programmes in ICT for school staff was ranked first (M=1.25), followed by the role of teachers in ICT implementation, as well as supervision from the Ministry of Education; both (M=1.37); and the role of school headmasters (M=1.39). Although they can be judged important, the least importance was given to providing a clear ICT policy (M=1.97), self-belief in using ICT in schools (M=1.98) and, finally, to change some of the misconceptions about using the internet at school (M=2.07).

Table 6.19: Important factors in successful ICT implementation

Important factors in successful ICT implementation	Very Important	Important	Neither	Not Important	Not important at all	Mean	SD
Good training programmes in ICT	76.5%	21.6%	1.9%	0.0%	0.0%	1.25	0.48
The role of teachers in ICT	69.6%	23.5%	6.9%	0.0%	0.0%	1.37	0.61
The supervision from the Ministry	68.6%	26.5%	3.9%	1.0%	0.0%	1.37	0.61
The role of the headmaster in ICT	66.7%	27.5%	5.9%	0.0%	0.0%	1.39	0.59
Technical support and maintenance	66.7%	24.5%	7.8%	1.0%	0.0%	1.44	0.72
Sufficient number of ICT resources	62.7%	25.5%	7.8%	3.9%	0.0%	1.52	0.80
The incentives and encouragement	51%	32.4%	15.7%	1.0%	0.0%	1.66	0.77
Appropriate buildings	54.9%	29.4%	9.8%	4.9%	1%	1.67	0.91
A clear ICT policy is	50%	25.5%	6.9%	12.7%	4.9%	1.97	1.23
Self-belief in using ICT in schools	42.2%	28.4%	19.6%	8.8%	1.0%	1.98	1.03
Changing misconceptions about Internet	38.2%	32.4%	14.7%	12.7%	2.0%	2.07	1.10

Overall, it can be judged that ICT and related issues are all important in the view of teachers. This is reflected in the average scores and percentages on all items.

- **Teachers' roles in ICT**

In this section, teachers were asked about the roles that they play in the implementation of ICT at their schools. Their roles were summarised in 17 items It was found, for the highest agreement, that the teachers involve students in the use of ICT in their lessons (M=1.79), followed by ‘asking the headmaster to help in providing ICT tools and maintenance’ (M=1.85) and ‘it is not my responsibility to provide ICT tools in school, it is the headmaster's role’ (M=1.86).

The items that received the least agreement were ‘follow up student complaints about what they face/need in their use of ICT tools and strive to resolve problems’ (M=2.61) and ‘they are keen to do repair and maintenance for ICT tools’ (M=2.62) and ‘I’m keen to attend ICT training courses (M=2.77).

Table 6.20: Teachers' roles in ICT implementation, presented in Percentages, Mean and SD

Teachers' roles in ICT implementation	S.A.	Agree	Neutral	Disagree	S.D.	Mean	SD
I involve students in the use of ICT in lessons.	41.6%	38.6%	18.8%	1.0%	0.0 %	1.79	0.77
I ask the headmaster to help in providing ICT tools and maintenance.	37.4%	45.5%	13.1%	2.0%	2.0%	1.85	0.86
It is not my responsibility to provide ICT tools, it is the headmaster's role.	42%	40%	12%	2.0%	4.0%	1.86	0.98
I encourage my students to search for information on the internet.	37.6%	43.6%	14.9%	3.0%	1.0%	1.86	0.84
I advise and encourage my colleagues to use ICT in lessons.	28.4%	47.1%	20.6%	3.9%	0.0%	2.00	0.80
I'm keen to learn how any device work before I use it.	33.7%	42.6%	12.9%	5.0%	5.9%	2.06	1.09
I ask students to pay attention to the safety of devices.	27.5%	40.2%	19.6%	4.9%	7.8%	2.25	1.14
I'm keen to adhere to safety requirements for the students when using ICT.	32.4%	32.4%	19.6%	6.9%	8.8%	2.27	1.23
I pay personally, if the school administration does not respond to maintenance issues.	30.7%	36.6%	12.9%	8.9%	10.9%	2.32	1.29
One of my duties is to assess how students employ computers in their studies.	21.2%	45.5%	17.2%	10.1%	6.1%	2.34	1.10
I 'm keen to learn about new developments in the world of technology to catch up with developed nations.	24.2%	32.3%	28.3%	10.1%	5.1%	2.39	1.11
I'm keen to employ ICT tools in my lessons to change classroom routines.	21.6%	29.4%	35.3%	6.9%	6.9%	2.48	1.11
I'm keen to provide an appropriate place to store ICT devices.	28.3%	32.3%	12.1%	13.1%	14.1%	2.52	1.39
I follow up student complaints about what they face/need in their use of ICT tools and strive to resolve problems.	24.5%	31.6%	13.3%	19.4%	11.2%	2.61	1.34
I'm not keen to do repairs and maintenance of ICT tools.	17.6%	41.2%	13.7%	15.7%	11.8%	2.62	1.27
I'm keen to attend ICT training courses.	12.9%	33.7%	25.7%	18.8%	8.9%	2.77	1.16

Overall, it can be concluded that the majority of items generated a positive agreement (mean less than M=2.5).

Teachers' views and understanding regarding the ICT policy were assessed using 13 items. The most agreement was generated for the view that 'there is a weakness in explaining of ICT policy and its education goals' (M=1.75), followed by the view 'The ICT policy is just theories, it has not been applied practically' (M=2.02) and the view that 'it is not my business to implement ICT' policy; it is the role of the headmaster' (M=2.17).

Disagreement was higher for the items stating that 'they have no idea about the policy towards the application of ICT' (M=3.25); that 'the Ministry of Education has developed clear goals and instructions on ICT implementation' (M=3.35) and, finally, 'ICT Education policy is clear' (M=3.75). (See table 6.21).

Table 6.21: Teachers' views about the ICT policy, presented in percentages, mean and SD

Teachers' views and understanding of the ICT policy	S.A.	Agree	Neutral	Disagree	S.D.	Mean	SD
There is a weakness in explaining the ICT policy and its educational goals	52%	25.5%	17.6%	4.9%	0.0%	1.75	0.91
The ICT policy is just theory, it has not been applied practically.	35.6%	39.6%	15.8%	4.0%	5.0%	2.02	1.06
It is not my business to implement the ICT policy; it is the role of the headmaster.	22.8%	41.6%	30.7%	5.0%	0.0%	2.17	0.84
I receive encouragement and support from the headmaster when I use ICT in my lessons.	13.7%	41.2%	21.6%	15.7%	7.8%	2.62	1.14
One of the duties of the Ministry of Education is to train teachers in advance about the education policy.	17.6%	31.4%	30.4%	5.9%	14.7%	2.68	1.25
I do not need to know about the ICT policy because nobody is likely to ask me about it.	9.0%	41%	29%	13%	8.0%	2.7	1.06
The ICT policy has a positive effect on my attitudes towards its use.	17.6%	28.4%	23.5%	26.5%	3.9%	2.70	1.15
Frankly, I haven't heard about the ICT policy.	7.8%	45.1%	17.6%	13.7%	15.7%	2.84	1.23
The Ministry of Education is keen to raise teacher awareness about the importance of ICT.	7.8%	33.3%	25.5%	24.5%	8.8%	2.93	1.11
I pay little attention to ICT due to the lack of clarity in the policy.	3.0%	35%	27%	23%	12%	3.06	1.09
I have no idea about the ICT policy.	2%	25.5%	33.3%	23.5%	15.7%	3.25	1.06
The Ministry of Education has developed clear goals and instructions on ICT implementation.	6.9%	15.7%	31.4%	27.5%	18.6%	3.35	1.15
The ICT education policy is clear.	2.0%	6.9%	24.5%	47.1%	19.6%	3.75	0.91

Overall, it can be assumed that there is a negative views and lack of understanding of the ICT policy. This is similar to the headmasters' views.

A number of challenges were listed that could face teachers when implementing or using ICT in schools. Their agreement was assessed on 28 possible challenges. The most agreement was generated for the 'growing number of students' (M=1.68), followed by the 'lack of understanding of ICT policy' (M=1.84), 'lack of ICT training' (M=1.88) and 'Favouritism plays an important role in the distribution of ICT tools' (M=1.99).

On the other hand, the challenges that received the highest disagreement were: teachers' resistance to change (M=2.91), teachers' negative attitude (M=3.07), teachers' lack of awareness about the importance of ICT in education (M=3.16) and, finally, 'traditions and beliefs' (M=3.16). (See table 6.22).

Table 6.22: Challenges facing ICT implementation of, presented in percentages, mean and SD

Challenges	S.A.	Agree	Neutral	Disagree	S.D.	Mean	SD
Growing number of students	56.0%	29.0%	8.0%	5.0%	2.0%	1.68	0.96
Lack of understanding of ICT policy	47.5%	28.3%	17.2%	6.1%	1.0%	1.84	0.98
Lack of ICT training programmes	39.6%	40.6%	11.9%	7.9%	0.0%	1.88	0.90
Favouritism plays an important role in the distribution of ICT tools	43.6%	27.7%	17.8%	7.9%	3.0%	1.99	1.09
Lack of time for training	39.2%	32.4%	16.7%	9.8%	2.0%	2.02	1.06
Lack of maintenance	36.0%	31.0%	17.0%	13.0%	3.0%	2.16	1.14
No, or slow, internet access	32.3%	35.4%	12.1%	14.1%	6.1%	2.26	1.22
Lack of ICT tools	32.0%	35.0%	14.0%	10.0%	9.0%	2.29	1.26
Students' negative attitudes	31.3%	31.3%	16.2%	18.2%	3.0%	2.30	1.18
Lack of building infrastructure	39.0%	20.0%	15.0%	22.0%	4.0%	2.32	1.30
Lack of storage space	32.3%	22.2%	17.2%	24.2%	4.0%	2.45	1.27
Lack of financial resources	24.8%	23.8%	34.7%	14.9%	2.0%	2.45	1.08
Lack of incentives and encouragement	23.8%	31.7%	20.8%	21.8%	2.0%	2.46	1.13
Lack of time to use ICT	15.7%	46.1%	16.7%	18.6%	2.9%	2.47	1.05
Lack of supervision from the Ministry of Education	21.0%	34.0%	24.0%	18.0%	3.0%	2.48	1.10
Lack of Teachers' experience/ skills in using ICT	19.2%	35.4%	26.3%	15.2%	4.0%	2.49	1.09
Scheduling problems	33.0%	34.0%	13.0%	17.0%	2.0%	2.62	4.33
Lack of classroom management skill	9.1%	43.4%	26.3%	16.2%	5.1%	2.64	1.02
Lack of appropriate space for the use of ICT	24.5%	24.5%	19.6%	24.5%	6.9%	2.64	1.27
Lack of headmaster supervision	18.2%	28.3%	26.3%	24.2%	3.0%	2.65	1.12
Lack of teacher collaboration	16.7%	31.4%	24.5%	19.6%	7.8%	2.70	1.19
Effect of climate on efficiency and performance of devices	12.7%	29.4%	31.4%	17.6%	8.8%	2.80	1.14
Lack of confidence	14.7%	23.5%	34.3%	19.6%	7.8%	2.82	1.14
Lack of technical support	9.9%	31.7%	28.7%	18.8%	10.9%	2.89	1.15
Teacher resistance to change	13.1%	28.3%	23.2%	24.2%	11.1%	2.91	1.22
Teachers' negatives attitudes	9.0%	18.0%	40.0%	23.0%	10.0%	3.07	1.08
Lack of teacher awareness about the importance of ICT in education	8.0%	24.0%	26.0%	28.0%	14.0%	3.16	1.17
Traditions and beliefs	14.7%	21.6%	18.6%	22.5%	22.5%	3.16	1.38

It should be noted that teachers provided agreement on most of the challenges. The majority of items appeared to be considered as challenges for teachers when considering the implementation of ICT in schools.

6.2.3. Students Questionnaire

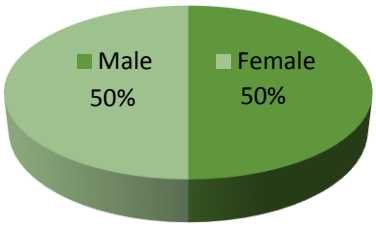
Similar to the earlier sections (headmasters' and teachers' questionnaires) the following section corresponds with the quantitative data generated from secondary schools' students.

This part of the analysis, as mentioned earlier, has some differences compared to headmasters and teachers' questionnaires, such as: students' views about the headmasters' and teachers roles' in ICT, their views about ICT as a subject and their attitude towards ICT tools (see table 6.2).

- **Student profile**

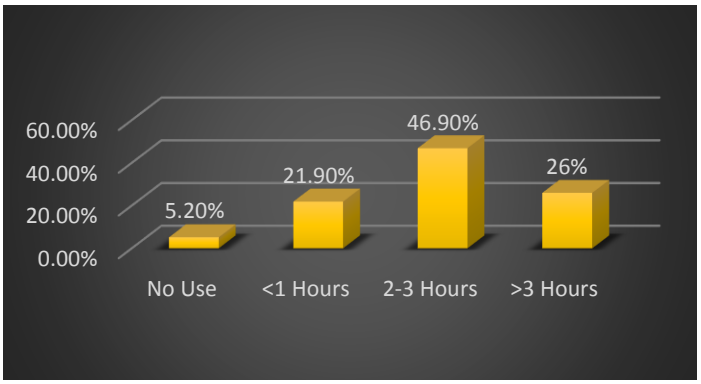
A hundred secondary school students took part in this questionnaire, stratified by gender: there were 50 males and 50 females.

Figure 6.8: Student gender



When asked about whether or not they possess a personal computer or laptop, the great majority (95%) stated that they do have a computer while 5% stated they do not have a personal computer. The majority of the students (46.9%) stated that they use computers between 2-3 hours a day (figure6.9).

Figure 6.9: Level of computer use per day in percentages.



The following section aims to explore the current ICT situation in schools. Students were asked about the availability of ICT devices, their ICT skills, their views and attitudes towards these tools and how they employ ICT tools in their schools.

- **Availability and use of ICT Tools**

This section aims to discover the availability and use of ICT tools in schools. Using 12 items, it was evident that generally the view is that ICT is limited or not available or used. When questions were ranked, it was shown that most agreement was generated from 'Microsoft Word' (M=3.18), followed by 'PowerPoint' (M=3.37) and 'Educational CDs and DVD player' (M=3.40). However, when looking at the end of this scale it was evident that the least availability and use was found for printers (M=4.55) and Interactive Whiteboard (M=4.58).

Table 6.23: Availability and use of ICT resources in school, presented in percentages, mean and SD

Availability and use of ICT	Available with use at all times	Available with frequent use	Available with limited use	Available with no use at all	Not available at all	Mean	SD
Microsoft Word	3.0%	29.0%	32.0%	19.0%	17.0%	3.18	1.12
PowerPoint	3.2%	32.3%	17.2%	18.3%	29.0%	3.37	1.29
Educational CDs and DVD player	8.2%	20.6%	20.6%	23.7%	26.8%	3.40	1.30
Scanner	3.1%	20.6%	24.7%	35.1%	16.5%	3.41	1.08
Access to computer for each student	4.1%	23.5%	20.4%	23.5%	28.6%	3.48	1.24
Computer lab	2.0%	26.0%	17.0%	26.0%	29.0%	3.54	1.21
Projector/ data show	1.1%	26.4%	12.1%	3.3%	57.1%	3.89	1.36
TV	7.1%	8.2%	9.2%	22.4%	53.1%	4.06	1.26
School website	3.1%	11.3%	7.2%	24.7%	53.6%	4.14	1.15
Printer	6.1%	4.1%	2.0%	4.1%	83.7%	4.55	1.13
Interactive whiteboard	5.4%	7.5%	10.8%	0.0 %	76.3%	4.58	.85
Student internet access	2.0%	3.0%	8.1%	3.0%	83.8%	4.63	.90

The table above clearly shows that there is limited availability of all ICT tools according to the students. This is reflected by average scores above 2.5 (the middle point).

- **Students' ICT skills**

Students' ICT skills were rated on 4 items from advanced to no skills. It was found that they were most skilled in 'Internet browsing' (M=1.76), followed by their skills in using 'Microsoft Word' (M=2.30), the overall 'Basic computer skills' (M=2.38) and lastly their skills in using 'PowerPoint' (M=2.47). Overall, students stated that they have skills above the intermediate level (table 6.24).

Table 6.24: Students, ICT skills, presented in percentages, mean and SD

Students' skills	Advanced	Good	Moderate	Poor	No skills	Mean	SD
Internet browsing	48.0%	30.0%	20.0%	2.0%	0.0 %	1.76	0.84
Microsoft Word	26.3%	36.4%	23.2%	9.1%	5.1%	2.30	1.11
Basic computer skills	19.0%	36.0%	34.0%	10.0%	1.0%	2.38	0.94
PowerPoint	27.0%	31.0%	22.0%	8.0%	12.0%	2.47	1.29

- **Student views and attitudes on ICT**

The views and attitude of students on ICT was examined in 15 items. It was found that most agreement was received for the item stating that the 'Use of ICT can save time and effort' (M=1.61), followed by 'I have a positive attitude on ICT equipment' (M=1.71) and then 'ICT plays an important part in the learning process' (M=1.76). High disagreement was found for 'The use of ICT is a dull activity' (M=3.81) and 'it is difficult to learn how to use a computer' (M=3.82) and the most disagreement was generated for the item stating that 'computers are unlikely to be important for the future' (M=4.05).

Table 6.25: Student attitudes and views on ICT, presented in percentages, mean and SD

Student attitudes and views in ICT	S.A.	Agree	Neutral	Disagree	S.D.	Mean	SD
Using ICT can save time and effort.	58.8%	24.7%	13.4%	2.1%	1.0%	1.61	0.87
I have a positive attitude in ICT equipment.	59.0%	24.0%	7.0%	7.0%	3.0%	1.71	1.06
ICT plays an important part in the learning process.	57.9%	20.0%	13.7%	4.2%	4.2%	1.76	1.10
ICT can improve students' research skills.	50.5%	24.2%	17.9%	5.3%	2.1%	1.84	1.03
ICT improves my knowledge.	47.5%	26.3%	20.2%	2.0%	4.0%	1.88	1.05
I learn best using ICT rather than traditional teaching methods.	48.0%	28.6%	14.3%	4.1%	5.1%	1.89	1.11
I find using ICT tools at school interesting.	52.0%	26.0%	9.0%	6.0%	7.0%	1.90	1.21
ICT increases teacher and student cooperation.	38.4%	22.2%	25.3%	11.1%	3.0%	2.18	1.15
I hate talking with others about computers.	10.3%	12.4%	24.7%	20.6%	32.0%	3.51	1.33
I feel unhappy in the computer lab.	11.2%	14.3%	12.2%	31.6%	30.6%	3.56	1.35
I feel helpless when my teacher asks me to do my homework on a computer.	9.2%	9.2%	23.5%	30.6%	27.6%	3.58	1.24
Using ICT during lessons bores me.	9.5%	7.4%	26.3%	25.3%	31.6%	3.62	1.26
Using ICT is a dull activity.	5.1%	14.3%	16.3%	22.4%	41.8%	3.81	1.26
It is difficult to learn how to use a computer.	9.2%	8.2%	16.3%	23.5%	42.9%	3.82	1.31
Computers are unlikely to be important to me in my future.	6.4%	6.4%	18.1%	13.8%	55.3%	4.05	1.25

Overall, students have a positive general attitude on ICT. This is reflected by more percentages scores under agreement and strong agreement. See table 6.23.

- **Application of ICT in students' school functions**

Students were asked about how often they use ICT and apply it in their learning at the school, (always → never). In doing so, it was found that the use of all items is mostly rare to never. It was also found that the use of a computer to prepare homework was used the most (M=3.22), followed by the use of PowerPoint (M=3.23) and the use of Microsoft Word (M=3.39). The table below also shows that the use of the internet for learning (M=3.82) and using the internet in school for chatting with people. (M=4.38) were the least used (See table 6.26).

Table 6.26: Application of ICT in school activities, presented in percentages, mean and SD

Application of ICT in school activities	Always	Often	Sometimes	Rarely	Never	Mean	SD
I use the computer to prepare my homework.	23.0%	16.0%	11.0%	16.0%	34.0%	3.22	1.60
I use PowerPoint.	14.1%	21.2%	18.2%	20.2%	26.3%	3.23	1.41
I use Microsoft Word.	14.1%	14.1%	19.2%	23.2%	29.3%	3.39	1.40
I use the internet for learning.	12.0%	10.0%	11.0%	18.0%	49.0%	3.82	1.43
I use the internet in my school for chatting with people.	5.1%	6.1%	7.1%	8.2%	73.5%	4.38	1.17

It appears that there is rare to no application of ICT tools by students in school activities based on their opinions.

- **Students' views towards ICT tools and ICT as a subject**

In this section, students were asked to state their views regarding the current conditions of ICT tools and ICT as a subject in their schools. Using 16 items, they showed most agreement on 'ICT needs development' (M=2.08) and that 'ICT as a subject is weak and does not provide any new information/skills for students' (M=2.28) and equally that 'ICT devices and applications need development' (M=2.28). The most disagreement was generated for 'safety facilities are available at the school' (M=3.34), 'the internet works very well at the school' (M=3.65) and 'There are enough computers in the computer lab for our lessons (M=3.82) (see table 6.27).

Table 6.27: Students' views regarding the subject of ICT, presented in percentages, mean and SD

Students' views regarding ICT tools and the subject of ICT	S.A.	Agree	Neutral	Disagree	S. D.	Mean	SD
The subject of ICT needs development	45.9%	20.4%	19.4%	8.2%	6.1%	2.08	1.24
The ICT subject is weak and does not provide any new information/skills for students.	31.5%	30.4%	20.7%	13.0%	4.3%	2.28	1.17
ICT devices and applications need development.	32.0%	27.8%	26.8%	6.2%	7.2%	2.28	1.18
The ICT subject is out of date and incompatible with most computer software.	34.7%	20.4%	24.5%	14.3%	6.1%	2.36	1.26
The ICT subject is easy for me.	31.9%	26.6%	18.1%	10.6%	12.8%	2.45	1.37
I already knew most of the computer skills before being taught.	27.1%	22.9%	21.9%	17.7%	10.4%	2.61	1.33
In my school, ICT devices are in good condition and high quality.	24.2%	27.3%	18.2%	14.1%	16.2%	2.70	1.40
We apply in practice what we've learnt using computers.	23.2%	29.5%	16.8%	13.7%	16.8%	2.71	1.40
The subject's helped me to learn about computers.	21.1%	14.7%	20.0%	29.5%	14.7%	3.02	1.37
The computer lab is always clean and tidy.	11.5%	27.1%	22.9%	21.9%	16.7%	3.05	1.27
My classroom's always set up in advance to use educational technology devices.	21.1%	18.9%	17.9%	15.8%	26.3%	3.07	1.50
Spaces are good enough in my school to use ICT	15.0%	19.0%	23.0%	20.0%	23.0%	3.17	1.37
The facilities in the computer lab are good, e.g. tables, chairs, ink etc.	13.4%	15.5%	25.8%	23.7%	21.6%	3.24	1.32
All the safety facilities we need are available in my school.	9.5%	17.9%	26.3%	21.1%	25.3%	3.34	1.29
The internet works very well in my school.	11.7%	3.2%	30.9%	16.0%	38.3%	3.65	1.33
There are enough computers in the computer lab for our lessons.	5.0%	14.0%	20.0%	16.0%	45.0%	3.82	1.28

By reflecting on all items, it is clear that students have negative views about the ICT classes and the quality of ICT tools in their schools. This is reflected in their answers to most of the items in the table above.

- **Students' views towards the headmaster's role in ICT**

Students were asked to explain the role of headmasters in facilitating use of ICT in their school. Using nine items, students rated their agreement on the role of the headmaster. The most agreement was for 'The headmaster is responsible for providing ICT tools and the maintenance

of educational technology'. (M=2.17). This was followed by their view that 'the headmaster is responsible for following up on the teachers' performance' (e.g. if they do not use ICT in lessons) (M=2.45) and, thirdly, they agree that they 'feel the school headmaster is interested in encouraging ICT use in the learning process' (M=2.81).

The least agreement was found for the views that the headmaster always listens to their requests about their ICT needs (M=3.42), that the headmaster encourages and supports students to use the computer lab throughout the whole school day (M=3.64) and their view that the school administration permits the use of the internet during the school day. (M=3.69). See table 6.28.

Table 6.28: Headmaster's role in ICT implementation, presented in percentages, mean and SD

Views regarding the headmaster's role in ICT	S.A.	Agree	Neutral	D.A.	S. D.	Mean	SD
The headmaster is responsible for providing ICT tools and the maintenance of educational technology.	44.9%	18.4%	18.4%	11.2%	7.1%	2.17	1.30
The headmaster is responsible for following up the teachers' performance (e.g. if they do not use ICT in lessons).	27.6%	25.5%	27.6%	12.2%	7.1%	2.45	1.21
I feel that the headmaster is interested in encouraging ICT in the learning process.	22.0%	22.0%	25.0%	15.0%	16.0%	2.81	1.36
The headmaster allows us to communicate with him/her electronically.	17.9%	22.1%	24.2%	15.8%	20.0%	2.97	1.38
The headmaster continuously monitors the presence and use of ICT in lessons.	15.3%	20.4%	23.5%	24.5%	16.3%	3.06	1.31
I feel that the headmaster is keen to develop and update the computer lab.	12.1%	20.2%	26.3%	21.2%	20.2%	3.17	1.30
The headmaster always listens to our requests about our ICT needs.	10.3%	14.4%	24.7%	23.7%	26.8%	3.42	1.30
The headmaster encourages and supports us to use the computer lab throughout the whole school day.	6.3%	11.5%	28.1%	19.8%	34.4%	3.64	1.23
The school headmasters permits the use of the internet during the school day.	10.4%	13.5%	13.5%	20.8%	41.7%	3.69	1.40

Overall, it can be seen that there are mixed opinions among students about the role and responsibility of the headmaster in the implementation of ICT in schools.

- **Students' views towards teachers' roles in ICT**

In this section the students were asked about their view about their teachers' role in ICT at the school. Overall, 16 questions were asked to assess their views. It was found that the most agreement was generated for the item 'I feel that the teacher of computer is qualified' (M=1.92), this was followed by their agreement that 'Teachers are not keen to maintain ICT devices during and after use.' (M=2.20). Furthermore, the highest agreement was generated for the item stating that 'teachers are not keen to use ICT tools during lessons' (M=2.38).

The last three items to receive disagreement are the items stating 'Teachers in my school allow us to get involved in ICT practically' (M=2.94), followed by 'the ICT teacher leaves us

unsupervised during the lesson' (M=2.96). Finally, the most disagreement was generated for the item stating that 'computer's teachers allows us to use the internet' (M=3.57) (see table 6.29).

Table 6.29: Views regarding teachers' roles in ICT, presented in percentages, mean and SD

Views regarding teachers' roles in ICT	S.A.	Agree	Neutral	Disagree	S.D.	Mean	SD
I feel that the teacher of computer is qualified	43.9%	28.6%	21.4%	3.1%	3.1%	1.92	1.02
Teachers are not keen to maintain ICT devices during and after use.	32.6%	34.7%	17.9%	9.5%	5.3%	2.20	1.15
Teachers in my school are not keen to use ICT tools during our lessons.	29.6%	34.7%	13.3%	12.2%	10.2%	2.38	1.30
Teachers are not keen to prepare for the use of ICT in advance.	26.5%	28.6%	26.5%	11.2%	7.1%	2.43	1.20
The computer teacher lets us work in groups.	24.5%	35.7%	19.4%	12.2%	8.2%	2.43	1.21
Teachers employ ICT in an appropriate way in lessons.	25.5%	29.6%	24.5%	13.3%	7.1%	2.46	1.21
The computer teacher is keen to provide new learning skills in ICT	26.8%	26.8%	27.8%	9.3%	9.3%	2.47	1.24
I feel that some teachers deliberately do not use ICT in their lessons.	27.6%	22.4%	27.6%	14.3%	8.2%	2.53	1.26
The computer teacher gives us instructions on how to use the computer.	23.2%	30.3%	26.3%	9.1%	11.1%	2.54	1.25
I receive encouragement from my computer teacher in my progression.	20.4%	34.7%	23.5%	10.2%	11.2%	2.57	1.24
The computer teacher prepares the computer lab in advance of the class.	23.0%	32.0%	19.0%	12.0%	14.0%	2.62	1.33
Teachers are keen to keep us safe, when they, or we, use ICT.	23.2%	21.2%	29.3%	16.2%	10.1%	2.68	1.27
I feel that most of the teachers in my school are highly qualified in the use of ICT.	16.2%	22.2%	35.4%	15.2%	11.1%	2.82	1.20
Teachers in my school allow us to get involved in ICT practically.	15.2%	34.8%	9.8%	20.7%	19.6%	2.94	1.40
The computer teacher leaves us unsupervised during the lesson.	19.4%	24.5%	16.3%	19.4%	20.4%	2.96	1.43
The computer teacher allows us to use the internet.	10.5%	17.9%	16.8%	12.6%	42.1%	3.57	1.44

Overall, the results are mixed regarding the role of teachers in using and implementing ICT. The results, based on frequencies and means scores, show some items with more disagreement and other with more agreement.

- **Challenges facing ICT implementation**

A total of 15 challenges that face ICT implementation in schools were listed for students to rate. It was found that they agree most that there is 'no or slow internet access in the school' (M=1.87), making it the main challenge, followed by the 'growing number of students' (M=2.14) and the 'lack of availability of space to use ICT' (M=2.19). On the other hand, it was found that students showed more disagreement with the challenge that 'climate affects the efficiency and the performance of ICT devices' (M=2.96). They also showed more disagreement that there is a 'lack of headmasters supervision over ICT implementation' (M=3.03) and, lastly, 'teachers negative attitudes' (towards ICT) (M=3.06) (see table 6.30).

Table 6.30: Challenges facing the implementation of ICT, presented in percentages, mean and SD

Challenges	S.A.	Agree	Neutral	Disagree	S.D.	Mean	SD
No, or slow, internet access	55.0%	13.0%	25.0%	4.0%	3.0%	1.87	1.10
Growing number of students	36.5%	32.3%	15.6%	11.5%	4.2%	2.14	1.16
Lack of available space to use ICT	31.6%	31.6%	24.5%	10.2%	2.0%	2.19	1.06
Lack of ICT tools	46.4%	15.5%	13.4%	19.6%	5.2%	2.21	1.34
Lack of teacher experience in ICT	34.4%	25.0%	17.7%	14.6%	8.3%	2.37	1.31
Students' negative attitudes	35.0%	17.0%	24.0%	16.0%	8.0%	2.45	1.32
Traditions and beliefs	29.3%	18.2%	28.3%	12.1%	12.1%	2.59	1.34
Lack of technical support	24.0%	22.0%	29.0%	15.0%	10.0%	2.65	1.27
Lack of collaboration	15.3%	30.6%	26.5%	20.4%	7.1%	2.73	1.16
Lack of maintenance	24.5%	20.4%	23.5%	19.4%	12.2%	2.74	1.34
Lack of building infrastructure	21.2%	9.1%	43.4%	18.2%	8.1%	2.82	1.19
Lack of teachers' skills	20.0%	20.0%	26.0%	25.0%	9.0%	2.83	1.26
Effect of climate on efficiency and performance of devices	12.4%	15.5%	44.3%	18.6%	9.3%	2.96	1.10
Lack of headmaster supervision over ICT implementation	18.6%	11.3%	30.9%	26.8%	12.4%	3.03	1.27
Teachers' negative attitudes	11.3%	18.6%	33.0%	26.8%	10.3%	3.06	1.15

Overall, it can be seen that there is more agreement with most of the challenges proposed to the students.

- **Satisfaction with the current ICT situation**

Students' satisfaction with the current ICT situation was ranked through eight items. The answers reflected that most satisfaction was generated for their ICT skills (M=2.45), followed by their attitude to ICT (M=2.81) and staff and student collaboration in ICT (M=3.03). The least satisfaction is generated for the 'current ICT situation' (Availability and use of ICT tools) (M=3.60), 'Ongoing development in the integration of ICT tools in your school' (M=3.75) and, finally, 'the internet service in the school' (M=3.80).

Table 6.31: Student satisfaction with the current ICT situation

Satisfaction towards	Extremely Satisfied	Satisfied	Neither	Dissatisfied	Extremely Dissatisfied	Mean	SD
Your ICT skills	22%	37%	19%	18%	4.0%	2.45	1.14
The attitude of students in ICT	19.2%	29.3%	15.2%	23.2%	13.1%	2.81	1.34
Staff and student collaboration in ICT	4.0%	34%	25%	29%	8.0%	3.03	1.05
Quality of ICT tools	6%	29%	31%	20%	14%	3.07	1.13
Educational outcome of using ICT tools	10.1%	24.2%	19.2%	28.3%	18.2%	3.20	1.27
Current situation (availability and use of ICT tools) in your school	3.0%	25.3%	10.1%	31.3%	30.3%	3.60	1.24
Ongoing development in the integration of ICT tools in your school	3.1%	16.3%	21.4%	20.4%	38.8%	3.75	1.21
Internet service and quality in your school	4.0%	15%	14%	31%	36%	3.80	1.19

Overall, it can be clearly observed that there is more dissatisfaction than satisfaction across most items when considering students satisfaction with ICT.

- **Important factors that make ICT more successful**

The important factors that make ICT more successful in schools were assessed based on eight items. It was clear that most importance was recorded for 'providing good training programmes

in ICT for school staff' (M=1.23), followed by the importance of teachers' role in ICT implementation (M=1.23), as well as providing a sufficient number of ICT tools (M=1.27). The least important factors in terms of mean score were technical support and maintenance (M=1.5), supervision from the Ministry of Education (M=1.63) and changing some of the misconceptions about using the internet at school (M=1.79) (see table 6.32).

Table 6.32: Participants' views of the factors leading to successful ICT implementation

Important factors that make ICT more successful	Very Important	Important	Neither	Not Important	Not important at all	Mean	SD
Good training programmes in ICT	77.8%	21.2%	1.0%	0.0%	0.0%	1.23	0.44
The teachers' role in ICT implementation	79.8%	18.2%	1.0%	1.0%	0.0%	1.23	0.51
Sufficient number of ICT tools	75.8%	21.2%	3.0%	0.0%	0.0%	1.27	0.51
The headmaster's role in ICT	73%	21%	5.0%	1.0%	0.0%	1.34	0.62
Appropriate buildings and infrastructure	74%	20%	1.0%	5.0%	0.0%	1.37	0.74
Technical support and maintenance are….	58.2%	33.7%	8.2%	0.0%	0.0%	1.5	0.64
Supervision from the Ministry	57.1%	27.6%	11.2%	3.1%	1.0%	1.63	0.87
Changing some of the misconceptions about using the internet at school	54%	26%	9.0%	9.0%	2.0%	1.79	1.06

Clearly by looking at the table above all items were considered very important. Students saw that most items are crucial and important when it comes to the use of ICT in school.

Following on from the descriptive analysis in the earlier sections, this part aims to report inferential statistics, which will test effects and relationships between the different scales in the questionnaires and personal details.

6.3. INFERENTIAL STATISTICS

6.3.1. Recoding and Reliability of Scales

Before measuring the reliability of each of the scales it was essential to recode negative items and unify the scales direction (all negative or all positive items). Items within scales in teachers' headmasters' and students' questionnaire were reverse coded by replacing values (5→1to 1→5, 4→2 to 2→4 and **3=3**) (Field, 2013). Unifying a positive or negative format for each of the scales allows a better measure of reliability.

The reliability of scales within questionnaires was tested using Cronbach's Alpha. It tests the consistency between answers within the same questionnaire (ranging from 0% to 100%). According to Field (2013) reliability near or above (0.70) is consisted good and scales are hence reliable. Overall as can be seen in the questionnaires from teachers and headmasters as well as students that overall reliability is good reflecting that each of the scales including items that have consistent answers with each other. See tables 6.33& 6.34 (For more details see appendix. 5).

Table 6.33: Cronbach's alpha reliability for teachers' and headmasters' questionnaires

Twelve main Scales	Number of variables	Cronbach's alpha reliability
ICT training	11	0.918
Current situation (availability of ICT tools and use)	14	0.817
ICT skills	8	0.913
Teachers' ICT usage	13	0.887
Headmasters' ICT usage	13	0.796
Challenges	28	0.875
Views and attitude towards ICT	20	0.847
Teacher's role towards ICT	16	0.877
Headmaster's role towards ICT	20	0.887
ICT policy (view and understanding)	13	0.710
Satisfaction towards ICT	12	0.891
Importance ICT factors	11	0.892

Table 6.34: Cronbach's alpha reliability for students' questionnaires

Ten main Scales	Number of variables	Cronbach's alpha reliability
ICT availability and use	12	0.708
ICT skills	4	0.866
ICT in school function	5	0.782
ICT challenges	15	0.808
View and attitude towards ICT	15	0.902
Headmasters' role towards ICT	9	0.827
ICT subject and ICT tools condition	16	0.701
Teacher's role towards ICT	16	0.732
Satisfaction	8	0.829
Importance ICT factors	8	0.848

6.3.2. Computing variables

Before proceeding with inferential statistics, each of the twelve main scales for headmasters and teachers as well as ten main scales for students (see table 6.2), were averaged (after re-coding negative questions and unifying the scales' direction). For example, the total of all the items within a scale divided by the number of items.

This has led to an average/mean variable that corresponds with each scale, which will represent the scale in inferential statistics. Due to the similarities between headmasters and teachers' questionnaires (same '12' main scales), they were combined together, also for the reason that there are a low number of headmasters, 28, who participated in this study. (Pallant, 2002).

6.3.3. Data type

Before commencing with inferential statistics, it is essential to determine whether the data is considered ***parametric or Non-parametric.*** This consideration will enable the selection of suitable inferential statistics for the current data. The data is considered parametric if it is considered of an interval scale and satisfies normal distribution. Failure in satisfying both conditions leads to the assumption for the data to be considered non-parametric (Field, 2013).

In this study, the researcher will assume that the data is considered interval, as it represents scores on a 5-point Likert scale that is averaged per scale to show an overall variable representing scores ranging from 1-5 (Field, 2013). In social and educational research such a scale is often considered interval rather than ordinal (Field, 2013).

In terms of normality of distribution the overall averages for all scales were tested using descriptive statistics (Frequency, Minimum, Maximum, Mean, Standard Deviation, Skewness and Kurtosis). Skewness' test reflects the distribution of the results around the mean and the kurtosis test reflects the peak of such distribution. For the data to be normally distributed it should range between +2 and -2 in both tests (see tables 6.35 & 6.36 below). In addition, by observing the two tables below it can be concluded that the data for headmasters, teachers and students is considered normally distributed (between +2 and -2) and, hence, the data is considered Parametric.

Table 6.35: Descriptive statistics and normality of variables representing headmasters and teachers

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
ICT training	129	1.00	5.00	3.6493	.94905	-.709	.213	.306	.423
Current situation	130	1.00	5.00	2.9759	1.02241	-.062	.212	-.818	.422
ICT skills	129	1.00	4.63	2.9341	.85559	-.130	.213	-.526	.423
Teachers' usage	101	1.00	4.58	2.7485	.82813	.128	.240	-.622	.476
Headmasters' usage	28	1.00	3.73	2.1071	.60460	.300	.441	.808	.858
Challenges	130	1.00	5.18	2.4022	.65771	.976	.212	1.408	.422
Views	130	1.00	3.40	1.8879	.55753	.705	.212	-.122	.422
Teacher's role	102	1.24	4.53	2.3525	.62101	.884	.239	.885	.474
Headmaster's role	28	1.20	3.45	1.9707	.48745	.948	.441	1.928	.858
ICT policy	130	1.46	3.91	2.7719	.43310	-.371	.212	.307	.422
Satisfaction	130	1.25	5.00	3.1327	.81509	-.283	.212	.170	.422
Importance factors	130	1.00	3.27	1.5706	.57026	.897	.212	.206	.422

Table 6.36: Descriptive statistics and normality of variables representing students

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
ICT availability	100	2.54	4.92	3.8102	.60034	-.140	.241	-.998	.478
ICT skills	100	1.63	4.88	3.2134	.80894	.107	.241	-.552	.478
ICT implementation	100	1.00	3.13	1.4243	.48680	.845	.241	-.069	.478
ICT challenges	100	1.00	4.50	2.2317	.89913	.472	.241	-.503	.478
ICT attitudes	100	1.40	5.00	3.6000	1.04212	-.284	.241	-.961	.478
Administrator's role	100	1.00	4.07	2.5816	.61824	-.200	.241	.164	.478
Current situation	100	1.00	4.33	2.0634	.75477	.380	.241	-.738	.478
Teacher's role	100	1.00	5.00	3.0373	.82636	-.015	.241	-.019	.478
Satisfaction	100	2.00	4.56	3.1334	.55804	.213	.241	-.331	.478
Importance factors	100	1.61	4.27	2.7042	.52454	.465	.241	.250	.478

6.3.4. Parametric tests to be used

The data is considered parametric; hence this study will employ suitable inferential statistics that aim to provide inferences from the current data to the bigger population (Field, 2013). A number of tests will be used here as listed below.

- **Pearson's r correlation coefficient**

This correlation test could be used to test whether or not two variables correlate with each other. The correlation is positive or negative. Positive correlation reflects that an increase in the scores of one variable leads to an increase in the scores of another variable.

On the other hand, the negative correlation explains that an increase in the score of one variable leads to a decrease in the score of another variable. Such a relationship is meaningless if the results of the test are not significant ($p>0.05$, meaning no relationship).

The significance value (alpha or probability) explains the chances of the results being down to chance, i.e. accidental.

The maximum acceptable chance is 5%, hence lower scores reflect a significant outcome. The correlation coefficient ranges between -1→ 0 → +1 (0% → 100%). For example, if the correlation between attending ICT training and ICT use was significant at $r=0.60$ $p=0.001(p<0.05)$, then it could be assumed that the more training attendance the more likely participants are to use ICT.

- **Independent samples t-test**

The independent samples t-test is used when measuring the differences between two independent groups i.e. the effect of one independent variable (that has two levels) on another dependent variable (e.g. effect of gender on ICT skills). The results of the t-test show whether or not there is a significant ($p<0.05$) effect of the independent variable on the dependent variable (e.g. gender on ICT skills).

- **One way analysis of variance (ANOVA)**

This test is similar to the independent samples t-test but is used when the independent variable has more than two levels i.e. finding the difference between three groups or more e.g. the effect of education level (more than two categories) on ICT skills (dependent variable). Significant results reflect significant differences between groups.

6.3.5 Correlations between variables (headmasters and teachers)

Overall, the twelve variables computed from the headmasters and teachers' questionnaire were correlated using Pearson's r correlation coefficient. The tests showed a significant positive and negative correlation with some variables. From the table below (6.37), it can be seen that the high level of ICT training is positively correlated with ICT skills. (i.e. better/more training leads to: better ICT skills, better ICT usage and better teaching role).

Table 6.37: Correlation between Level of ICT training and some variables

variable	Correlation	Values of Pearson's r=	Sig.
Level of ICT training	A significant positive correlation with teachers & headmasters ICT skills	r(129)=0.622	p=0.000
	A significant positive correlation with ICT usage (teachers)	r(100)=0.620	p=0.000
	A significant positive correlation with ICT usage (headmasters)	r(28)=0.443	p=0.018
	A significant positive correlation with teachers' role	r(100)=0.201	p=0.044

With regards to the current situation, it was more positively explained by teachers and headmasters who have good ICT skills because they were aware of exactly what they wanted. In addition, the availability of ICT tools has a significant positive correlation with teachers' usage and role. In other words, when these tools are available the involvement of the headmasters, as well as teachers' usage will be better. On the other hand, when these tools are not available, this will affect their views and attitudes on ICT negatively (See the table 6.38).

Table 6.38: Correlation between The current situation and some variables

variable	Correlation	Values of Pearson's r:	Sig.
The current situation (availability and use of ICT tools)	A significant positive correlation with headmasters' and teachers' ICT skills	r(129)=0.203	p=0.021
	A significant positive correlation with ICT teachers' usage	r(101)=0.422	p=0.000
	A significant positive correlation with teachers' role	r(102)=0.336	p=0.001
	A significant ***negative*** correlation with views and attitudes in ICT	r(130)=-0.194	p=0.027

The level of ICT skills was tested to find any significant correlation with any other variables. The results showed that when the level of ICT skills increases the usage of ICT by headmasters and teachers increases. In addition, the role of the headmasters and teachers who have good ICT skills positively affects ICT implementation positively (See table below).

Table 6.39: Correlation between The level of ICT skills and some variables

variable	Correlation	Values of Pearson's r:	Sig.
The level of ICT skills	A significant positive correlation with ICT usage (teachers)	r(100)=0.601	p=0.000
	A significant positive correlation with ICT usage(headmasters)	r(28)=0.495	p=0.007
	A significant positive correlation with teachers' role	r(101)=0.342	p=0.000
	A significant positive correlation with headmasters' role	r(28)=0.592	p=0.001

The headmasters and teachers who faced more challenges in their job, with regards to ICT implementation, were more limited in their skills, as well as they showed negative views and understanding of ICT policy (see table below).

Table 6.40: Correlation between The Challenges and some variables

variable	Correlation	Values of Pearson's r:	Sig.
challenges	A significant negative correlation with the teachers' role in ICT	r(102)=-0.207	p=0.037
	A significant negative correlation with teachers views and understanding of ICT policy	r(130)=-0.240	p=0.006

Finally, the headmasters' and teachers' views on ICT integration in education were positively correlated with their views and understanding of ICT policy. When their view and understanding of the ICT policy is high positive, as a result, their acceptance of using these tools in education will be better (see table below).

Table 6.41: Correlation between Views in ICT integration in education and ICT policy

variable	Correlation	Values of Pearson's r:	Sig.
Views in ICT integration in education	A significant positive correlation with views and understanding of ICT policy	r(130)=0.318	p=0.00

- **Effect of gender (headmasters and teachers)**

Using an independent samples t-test, this test shows whether or not there is a significant ($p<0.05$) effect of the independent variable (e.g. gender) on the dependent variable (e.g. current ICT situation).

The results show that gender has a significant effect on the participants' views towards the current ICT situation (availability and implementation), where a higher average score was generated by the female participants compared to male participants (teachers and headmasters): $t(128)=2.70$, $p=0.008$ ($p<0.05$).

This means that the females have positive views about what they have in their schools compared to the males. This could be related to the females' attitudes to the implementation of ICT in their schools being more positive.

In addition, gender has a significant effect on the participants' views and understanding of ICT policy, where females also had a higher mean score compared to males (teachers and headmasters): $t(128)=2.66$, $p=0.009$. In others words the females, again, are more informed and aware than males about the current ICT policy.

This could be related to what was previously stated, as the males have less positive views on ICT implementation in education.

For teachers, a significant effect of gender was found in their usage of ICT; t(99)=1.99, p=0.048; and on their roles and responsibilities in ICT: t(100)=2.32, p=0.022. Females on both variables generated higher mean score. No significant difference was found in other variables (p>0.05) (see table 6.42).

Table 6.42: Group statistics between both genders (independent samples t-test)

	Gender	N	Mean	Std. Deviation
ICT training	Male	63	3.55	1.024
	Female	66	3.74	.869
Current situation	Male	64	2.73	.970
	Female	66	3.20	1.02
ICT skills	Male	63	2.81	.906
	Female	66	3.04	.795
ICT usage: teachers	Male	49	2.58	.889
	Female	52	2.90	.739
ICT usage: headmasters	Male	14	2.10	.424
	Female	14	2.10	.760
Challenges	Male	64	2.46	.701
	Female	66	2.33	.610
Views towards ICT integration	Male	64	1.92	.586
	Female	66	1.85	.529
Teacher's role in ICT	Male	50	2.21	.621
	Female	52	2.48	.594
Headmaster's role in ICT	Male	14	1.97	.276
	Female	14	1.96	.645
ICT policy	Male	64	2.67	.442
	Female	66	2.86	.403
Satisfaction Level	Male	64	3.21	.682
	Female	66	3.05	.924
Importance factors for ICT	Male	64	1.50	.510
	Female	66	1.63	.618

- **Differences between headmasters and teachers**

A comparison was conducted between scores generated by headmasters and those generated by teachers across the shared variables.

Using the independent samples t-test it was found that the only significant difference came in the views regarding the challenges facing ICT, where the teachers had a higher overall score compared to the headmasters: t(127)=2.86, p=0.002.

Also, a significant difference was found on the importance of ICT, where teachers also had a higher mean score compared to the head teachers: t(128)=2.02, p=0.047. No significant difference was found in other variables (p>0.05). See figure 6.43

Table 6.43: Group statistics between teachers and headmasters (independent samples t-test)

	Participant	N	Mean	Std. Deviation
ICT training	Teacher	101	3.61	.977
	Headmaster	28	3.78	.841
Current situation	Teacher	102	3.03	1.073
	Headmaster	28	2.77	.793
ICT skills	Teacher	101	2.90	.875
	Headmaster	28	3.03	.786
Challenges	Teacher	102	2.48	.669
	Headmaster	28	2.09	.517
Views towards ICT	Teacher	102	1.89	.569
	Headmaster	28	1.86	.518
ICT policy	Teacher	102	2.76	.447
	Headmaster	28	2.80	.380
Satisfaction Level	Teacher	102	3.14	.764
	Headmaster	28	3.09	.992
Importance ICT factors	Teacher	102	1.61	.604
	Headmaster	28	1.41	.393

6.3.6. *Correlations between variables (Students)*

In this section, the correlation between the ten overall variables were correlated for students' data and only significant results are reported. The ICT implementation had a significant positive correlation with ICT availability and with students' ICT skills. This indicates that the higher participants rate ICT implementation, the higher they will rate ICT availability and ICT skills (high scores reflect disagreement or low skills). In addition, teachers' role was found to have a significant positive correlation with ICT implementation and headmasters' role. See table below.

Table 6.44: Correlation between ICT implementation and some variables

variable	Correlation	Values of Pearson's r:	Sig.
ICT implementation	A significant positive correlation with ICT availability	r(100)=0.232	p=0.020
	A significant positive correlation with ICT skills	r(100)=0.296	p=0.003
	A significant positive correlation with Teachers' role	r(100)=0.282	p=0.005
	A significant positive correlation with headmasters' role	r(100)=0.329	p=0.001

Views and attitudes on ICT tools had a significant positive correlation with students' skills, where higher scores on attitude to ICT lead to higher scores in their skills. See table below.

Table 6.45: Correlation between Views and attitude in ICT tools and students' skills

variable	Correlation	Values of Pearson's r:	Sig.
Views and attitude in ICT tools	A significant positive correlation with students' skills	r(100)=0.347	p=0.000

The headmaster's role was found to have a significant positive correlation with ICT implementation, where a higher score in one leads to a higher score on the other. However, a

higher score on the headmaster's role likely leads to a poor views towards ICT, reflecting a negative correlation: r(100)=-0.276, p=0.005.

Table 6.46: Correlation between Views towards headmaster's role and ICT implementation

variable	Correlation	Values of Pearson's r:	Sig.
Views towards headmaster's role	A significant positive correlation with ICT implementation	r(100)=0.383	p=0.000

The current ICT situation was found to have a significant positive correlation with ICT implementation and negative correlation with ICT challenges (an increase in one score leads to a decrease in the other) while having a positive correlation with the headmasters' role. See table below.

Table 6.47: Correlation between The current situation and some variables

variable	Correlation	Values of Pearson's r:	Sig.
The current ICT situation	A significant positive correlation with ICT implementation	r(100)=0.202	p=0.043
	A significant ***negative*** correlation with ICT challenges	r(100)=-0.233	p=0.02
	A significant positive correlation with headmasters' role	r(100)=0.559	p=0.000

6.3.7. Effect of gender (students)

The effect of gender (male vs. female) was measured on all the variables. It was evident that there is a significant effect on the way male and female students view the administrator's role. Female participants showed a higher score compared to the male participants, indicating a significant effect: t(98) =2.29, p=0.024. Gender had no significant effect on other variables (p>0.05).

Table 6.48: Group statistics between genders for students

	Gender	N	Mean	Std. Deviation
ICT availability	Male	50	3.7748	.60619
	Female	50	3.8455	.59847
Satisfaction	Male	50	3.1696	.68284
	Female	50	3.2571	.92301
Importance	Male	50	1.3500	.44032
	Female	50	1.4986	.52312
ICT skills	Male	50	2.3633	.84125
	Female	50	2.1000	.94356
ICT implementation	Male	50	3.5870	.98648
	Female	50	3.6130	1.10485
ICT challenges	Male	50	2.6130	.59972
	Female	50	2.5502	.64075
ICT attitudes	Male	50	2.1949	.73967
	Female	50	1.9319	.75405
Administrator's role	Male	50	2.8515	.73189
	Female	50	3.2232	.87951
Current situation	Male	50	3.0604	.56043
	Female	50	3.2064	.55155
Teacher's role	Male	50	2.7279	.57747
	Female	50	2.6805	.47042

6.3.8. Computer access at home (students)

The effect of having a personal computer or not was measured on all variables using an independent samples t-test. A limitation here is that there were only five participants who stated that they do not have a computer compared to 95 who have a computer; hence the comparison, might not be reliable. Despite that, it was evident that there was a significant difference between the groups in the availability of ICT and its use. Participants who do not have computers showed a significantly higher average compared to those who have computers and the result of the t-test was t(98)=3.95, p=0.007.

A significant effect was also found on ICT skills where those who do not have computers showed higher scores compared to those who do have computers, t (95) =2.96, p=0.009. In ICT implementation students who do not have computers showed a higher score (M=4.63) compared to those who do have computers (M=3.60), t (98) =5.16, p=0.001. Other results were not found significant (p>0.05).

Table 6.49: Group statistics between students who have and do not have computers

	Do you have a personal computer in your home?	N	Mean	Std. Deviation
ICT availability	Yes	95	3.7831	.60135
	No	5	4.3240	.27309
Satisfaction	Yes	95	3.1825	.80938
	No	5	3.8000	.59029
Importance	Yes	95	1.4150	.48349
	No	5	1.6000	.57554
ICT skills	Yes	95	2.1728	.87521
	No	5	3.3500	.60208
ICT implementation	Yes	95	3.5453	1.03734
	No	5	4.6400	.40988
ICT challenges	Yes	95	2.5881	.62629
	No	5	2.4581	.47122
ICT attitudes	Yes	95	2.0425	.74927
	No	5	2.4619	.83530
Administrator's role	Yes	95	3.0171	.82259
	No	5	3.4222	.89718
Current situation	Yes	95	3.1359	.54548
	No	5	3.0852	.84381
Teacher's role	Yes	95	2.6927	.52808
	No	5	2.9222	.44026

6.4. MAIN FINDINGS

The main concern of this chapter was to assess the level of ICT implementation tools, from different angles, in Saudi secondary schools, in order to identify the main factors for successful ICT implementation. The following observations were reached as a summary of this chapter.

- **Current availability and use of ICT tools**

The most important ICT tools that should be available and used in classrooms are, for example, the computer, internet, interactive whiteboard and projectors. However, the results showed variety across all schools. The availability and use of the internet at schools was low. For example, only 3.6% of headmasters agreed that internet access is available for student. This could be related to the poor condition of the internet at schools, as viewed by 85% of students. On the other hand, only 39% of teachers are able to access the internet. Regarding the interactive whiteboard, 50% of schools do not have/use them, as reported by teachers. Regarding the projector device, almost 60% of students reported not available at all or available with limited use.

Finally, the access to computers, for teachers, was good (nearly 70%) whereas, access for students was low (25%). This could be related to the shortage in the number of computers in schools (61% of students strongly agree and agree). In general, there were varying levels of use of software and hardware among all schools.

- **Level of ICT Skills**

The results showed disparity in ICT skills between teachers, headmasters and students. For instance, only 11% of headmasters are able to fix and deal with technical ICT problems. Regarding their skills in using Microsoft Word, the results have reported that nearly 43% of headmasters use this application in their daily work. Regarding teachers' ICT skills, the study found 23% of teachers have advanced and good skills in using interactive whiteboards and only 28% of them are able to use projectors in their lessons. However, the students' skills were higher than headmasters and teachers in all ICT skills. This suggests that challenges arise and it can leave a massive gap in ICT skills, particularly between students and teachers.

- **Level of ICT Training**

The results showed variation in the level of ICT training among headmasters and teachers. However, the study found 85% of headmasters have no training in using interactive whiteboards, 75% have no training in using projector devices and 71% have no training in computer maintenance. On the other hand, only 20% of teachers have training in using interactive whiteboards, 12% have training in computer maintenance and 15% have training in using projector devices. By a quick glance, it can be said there is a relation between ICT training and ICT skills. For instance, 71% of headmasters have no training in computer maintenance, therefore, it is not surprising, as mentioned earlier about the headmasters' skills in ICT, only 11% of them are able to fix and deal with technical ICT problems.

- **The application of ICT tools in school functions**

The results of the study showed positive implementation for available ICT tools among all headmasters. However, the study found a lack of using ICT tools in teachers' school functions. For example, only 30% of teachers (always or often) used interactive whiteboards and nearly 20% used projectors. Using ICT tools for communication and work in partnership between teachers and parents, the results showed nearly 21% of teachers use it. Regarding the students, the results showed only 22% of students are using the internet for learning at schools and 28.2% of them use Microsoft Word in their work at schools. This could be related to the shortage in the number of computers among the schools (nearly 75% of schools have a shortage in the number of computers).

- **Perception, views and attitudes on ICT in education**

Although most participants reported positive views and attitudes towards the value of ICT in education. They agree it has a future in education and has a positive impact on learning, cooperation and interaction between students and teachers. However, the study found 60.4% of headmasters think, due to religious duty, the internet should be banned in secondary schools and 71% of them forbid the use of the internet in school, because high school students are at a critical age and 60.9% do not encourage the use of the internet in schools because it is contrary to traditions and customs. In addition, 64.3% of them agree that the money spent on the ICT sector is not worth it. It can be said that the limited use of the internet is one of the main challenges in applying ICT in schools.

- **Headmasters' and teachers' views and understanding of ICT policy**

The results of this chapter showed there are different challenges in terms of ICT policies. For example, there is a need to clarify the ICT policy for both headmasters and teachers. In confirmation of this, only 22.6% of teachers reported they agree that the Ministry of Education has developed clear goals and instructions on ICT implementation. As a result, only 9% of teachers see this policy as clear, while 52.9% reported they haven't heard about the Ministry of Education's ICT policy. More than 50% of them believe that there is a weakness in ICT policy explaining and its educational goals. Similarly, 82.3% of headmasters agree on this matter. In addition, 71% of headmasters agree that the education policy on the use of ICT does not provide them with sufficient authority to achieve its goals. Finally, the study found that educating teachers in advance about the Saudi education policy (92.9 of headmasters range from strongly agree to neutral) and raising their awareness (85.7 of headmasters agree) about its goals is crucial.

- **Headmasters' role in ICT**

The results showed most headmasters are carrying out their duties in ICT satisfactorily. They are keen to provide all ICT resources and ICT safety requirements at the schools and encourage teachers to use ICT in lessons. Although, they reported that they encourage students and teachers to use the internet at schools. However, students' results show a contradiction with headmasters' results. For example, only 23.9% of students agree that the school headmaster permits the use of the internet during the school day and only 17.9% agree that the headmaster encourages and supports them to use the computer lab throughout the whole school day.

The interesting point was that nearly 35.7% of the headmasters believe 'it is not their responsibility to apply the ICT policy and it is the responsibility of the Ministry of Education'. This result gives an indicator that some headmasters did not know their responsibility in ICT. Overall, it should be noted that the majority of the steps that were taken for the implementation of ICT in schools by the headmasters were carried out and they showed positive scores across most questions.

- **Teachers' role in ICT**

The results also showed that the teachers involve students in the use of ICT in their lessons (80.2%), asking students to pay attention to the safety of ICT devices (67.7%). Moreover, they were keen to provide the right place to store ICT tools (60.6%). On the other hand, the results show nearly 46.6% of them agree that they are not keen to attend ICT training courses and 72.5% are not keen to do repairs and maintenance on the ICT tools (from strongly agree to neutral). This could be related again to the lack of maintenance training. Overall, it can be concluded that the majority of teachers had a positive role in ICT implementation.

- **Students' views on ICT tools and classes**

The study found weakness in ICT as a subject. Most students agree it needs development and it does not help in providing new skills for them (66.3%). Furthermore, nearly half of them (46.4%) do not agree that safety facilities are available in the computer lab. Furthermore, the internet service is not available or not working well (only 14.9% agree). Finally, only 19% agree that the number of computers at the computer lab is enough for students i.e. a computer per student in the class.

- **Students' views regarding the head teacher's role in ICT**

The results showed most students agree that the school headmasters are interested in encouraging use of ICT tools in their learning process and that they are responsible for providing ICT tools and maintenance. This was followed by their view that the headmasters are responsible for following up the teachers' performance with regards to ICT implementation.

However, few students reported that the headmasters respond to their requests about ICT (24.7%). 17.9% reported that the headmasters allow them to use the computer lab throughout the school day. Finally, 23.9% of students agree that the headmasters permit access to the internet during the school day. This reflects the shortfall in the headmasters' performance, especially regarding using the internet at schools.

- **Students' views regarding the teachers' role in ICT**

In general, students showed mixed views towards their teachers' role in ICT implementation. For example, only 38.4% of students believe that their teachers are qualified in using ICT tools. This could be related, as mentioned earlier, to the low level in ICT training. In addition, 67.3% of students agree that teachers are not keen to maintain ICT devices during and after use and 64.3% say teachers are not keen to use ICT tools during lessons and half of them (50%) agree that some teachers deliberately do not use ICT in their lessons. Finally, 28.4% confirmed that the computer teachers allow them to use the internet during the lessons.

- **Satisfaction with ICT and related issues**

In general, the study found a low level of satisfaction with the current ICT situation and related issues among the participants. However, to obtain a clear picture about the level of satisfaction, the important factors for ICT implementation and the main challenges facing ICT implementation (from the perspective of participants) the study followed Fink (2003), who suggested the combination of a five-point Likert scale (Agree, Strongly agree, Neutral, Disagree and Strongly disagree) to three scales (Agree-Neutral-Disagree). This method helps the study to assess the level of satisfaction (table 6.52), important ICT factors (table 6.53) and the main challenges facing ICT implementation (table 6.54). Accordingly, the study will discuss in the following chapter the agreement level in the participants' views (Agree and disagree).

Table 6.50: The satisfaction level among all study's participants

Issues of satisfaction	**Satisfaction Level Among**							
	Headmasters		**Teachers**		**students**		**Average**	
	Satisfied	Dissatisfied	Satisfied	Dissatisfied	Satisfied	Dissatisfied	Satisfied	Dissatisfied
Your ICT skills	64.3	14.2	37.2	35.2	59	24	53.5	24.4
Students attitude of in ICT	39.3	35.7	48	33.3	48.5	36.3	45.2	35.1
Current situation	25	64.2	31.4	45.1	28.3	61.6	28.2	56.9
Your role in ICT implementation	71.5	17.8	49.1	16.6			60.3	17.2
Outcome of using ICT	39.3	35.7	36.2	30.3	34.3	46.5	36.6	37.5
Quality of ICT tools	39.2	42.9	37.2	32.3	35	34	37.1	36.4
ICT policy (goals and clarity)	32.2	50	29.4	42.2			30.8	46.1
Collaboration (between staff)/ students	32.2	39.3	29.4	45.1	38	37	33.2	40.4
Ongoing development in ICT	32.1	39.3	26.5	44.1	19.4	59.2	26	47.5
Support and supervision from MoE	35.7	50	28.5	47			32.1	48.5
ICT training	10.7	60.7	26.4	48.1			18.5	54.4
The internet service in your school	32.2	42.9	20.6	62.8	19	67	23.9	57.5

- **Important factors for successful ICT implementation**

Following the same procedure above, the table below illustrates, by percentage, the important factors for successful ICT implementation, from the study's perceptions.

Table 6.51: The importance ICT factors from the participants' perceptions

Important ICT factors	Level of Agreement							
	Headmasters		*Teachers*		*Students*		*Average*	
	Important	Not-important	Important	Not-important	Important	Not-important	Important	Not-important
Training in ICT for school staff	100%	0.0%	98.1%	0.0%	99%	0.0%	99%	0.0%
Headmaster's role in ICT	100%	0.0%	94.2%	0.0%	94%	1.0%	69%	0.3%
Teacher's role in ICT	100%	0.0%	93.1%	0.0%	98%	1.0%	97%	0.3%
Sufficient number of ICT resources	100%	0.0%	88.2%	3.9%	97%	0.0%	91.7%	1.3%
Technical support and maintenance	100%	0.0%	91.2%	1.00%	91.9%	0.0%	93.3%	3.0%
Appropriate buildings and infrastructure	96.4%	0.0%	84.3%	5.0%	94.0%	5.0%	91.5%	3.3%
Incentives and encouragement	92.8%	0.0%	83.4%	1.0%			88.1%	5.0%
Clear ICT policy	89.3%	7.1%	75.5%	17.6%			82.4%	12.3%
Supervision from the Ministry	92.8%	7.2%	95.1%	1.0%	84.7%	4.1%	90.8%	4.1%
Self-belief and motivation	78.5%	7.1%	70.6%	9.8%			74.5%	8.4%
Changing misconceptions about the internet	57.1%	21.4%	70.6%	14.7%	80%	11.0%	69.2%	15.7%

- **Challenges facing ICT implementation**

Generally, addressing various challenges at all levels is required, as made evident in this section. The table below summarizes all of the ICT challenges reported from the perceptions of headmasters, teachers and students. However, the study will discuss all these factors in the following chapter.

Table 6.52: Average of ICT challenges from the participants'' perceptions

Challenges	**Headmasters**		**Teachers**		**Students**		**Average%**	
	Agree	**Disagree**	**Agree**	**Disagree**	**Agree**	**Disagree**	**Agree**	**Disagree**
Growing number of students	100%	0.0%	85%	7.0%	69%	7	**84.6%**	**4.6%**
Lack of understanding of ICT policy	57.1%	14.3%	75.8%	7.1%	*****	*****	**56.4%**	**10.7%**
Lack of ICT training programmes	92.9%	0.0%	80.2%	7.9%	*****	*****	**86.5%**	**3.9%**
Favouritism	89.2%	3.6%	71.3%	10.9%	*****	*****	**80.2%**	**7.2%**
Lack of time for training	66.6%	7.4%	71.6%	11.8%	*****	*****	**69.1%**	**9.6%**
Lack of maintenance	75%	7.1%	67%	16%	44.9%	31.6	**62.3%**	**18.2%**
No, or slow, internet access	85.7%	10.7%	67.7%	20.2%	68%	7	**73.4%**	**12.6%**
Lack of ICT tools	96.4%	0.0%	67%	19%	61.9%	24.8	**75.1%**	**14.6%**
Students' negative attitudes	78.6%	3.6%	62.6%	21.2%	52%	24	**64.6%**	**16.2%**
Lack of building infrastructure	71.5%	14.3%	59%	26%	30.3%	26.3	**53.6%**	**22.2%**
Lack of storage space	71.4%	14.2%	54.5%	28.2%	*****	*****	**62.9%**	**21.2%**
Lack of financial resources	85.7%	10.7%	48.6%	16.9%	*****	*****	**67.1%**	**13.8%**
Lack of incentives and encouragement	60.7%	17.9%	55.5%	23.8%	*****	*****	**58.1%**	**20.8%**
Lack of time to use ICT	71.4%	14.3%	61.8%	21.5%	*****	*****	**66.6%**	**17.9%**
Lack of Ministry supervision	100%	0.0%	55%	21%	29.9%	39.2	**61.6%**	**20%**
Lack of Teachers' experience in ICT	67.8%	25%	54.6%	19.2%	59.4%	22.9	**60.6%**	**22.3%**
Scheduling problems	71.5%	10.7%	67%	19%	*****	*****	**69.2%**	**14.8%**
Lack of classroom management skills	71.4%	17.9%	52.5%	21.3%	*****	*****	**61.9%**	**19.6%**
Lack of spaces	75%	7.2%	49%	31.4%	63.2%	12.2	**62.4%**	**16.9%**
Lack of headmaster supervision	46.5%	27.2%	46.5%	27.2%	42.4%	39.2	**45.1%**	**31.2%**
Lack of teacher collaboration	60.8%	17.9%	48.1%	27.4%	45.9%	27.8	**51.6%**	**24.3%**
Effect of climate on ICT efficiency	42.9%	10.7%	42.1%	26.4%	27.9%	27.9	**37.6%**	**21.6%**
Lack of confidence	42.9%	32.2%	38.2%	27.4%	*****	*****	**40.55**	**29.8%**
Lack of technical support	89.2%	3.6%	41.6%	29.7%	46%	25	**58.9%**	**19.4%**
Teacher resistance to change	50%	21.5%	41.4%	29.7%	*****		**45.7%**	**25.6%**
Teachers' negatives attitudes	53.6%	25%	27%	33%	29.9%	37.1	**36.7%**	**31.7%**
Lack of teacher awareness	85.7%	3.6%	32%	42%	*****	*****	**58.8%**	**22.8%**
Traditions and beliefs	46.5%	42.9%	36.3%	45%	29.9%	24.2	**37.5%**	**37.3%**

6.5 CONCLUSION

The use of surveys in this chapter has helped to examine the current ICT situation implementation, from the perspective of headmasters, teachers and students at Saudi secondary schools. This examination has contributed to the achievement of the study's third and fourth objective in terms of its endeavours to examine current ICT implementation in Saudi secondary schools, guided by criteria defined in the study's conceptual framework and the information that has been gathered from the interviews in order to identify the factors that might facilitate or hinder the application of ICT tools in general and in Saudi secondary schools in particular. The gathered data helped to identify the main barriers preventing ICT implementation in Saudi secondary schools. To develop ICT in Saudi schools there is a need to address different barriers, such as lack of maintenance, infrastructure, resources, skilling up the headmasters and teachers, improving ICT classes, managing resources, lack of headmaster and teacher involvement in ICT implementation, culture (e.g. tradition and beliefs), lack of ICT resources and an inadequate ICT policy. In the following chapter (7) the findings of the study will be discussed in the light of the study's fifth objective: its endeavours to propose a strategic framework for ICT implementation in Saudi secondary schools and draw recommendations. This will be followed by the study's main findings, conclusions, limitations, beneficiaries and future work.

CHPTER VII

DISCUSSION OF QUALITATIVE AND QUANTITATIVE RESULTS

7. INTRODUCTION

This chapter focuses on discussing the main findings that emerged in this study (qualitative and quantitative results), supported by the empirical and theoretical literature in order to identify the factors that might hinder the utilization of ICT tools in Saudi secondary schools.

7.1 DISCUSSION OF QUALITATIVE AND QUANTITATIVE RESULTS

The classification of the discussion will be in seven main criteria, each criteria has several sub-factors, which is in line with the study conceptual framework (See table 2.5). The following section discuss factors in school level.

1- School Culture

a) View and attitude towards ICT integration in education

The review of the literature in chapter two and three revealed that the successful implementation of ICT in education is strongly linked to understanding the school culture, for instance, the views and attitudes of ICT end-users (Levin and Wadmany, 2005). The level of their satisfaction with the current situation of ICT implementation (Sparks, 1994), as well as the impact of religion and culture on the use of the Internet in schools (Albirini 2006; Al-Sulaimani 2010). The computer utilization behaviour model (MPCU) assumes that behaviour determines what people like to do (attitudes), what they think they should do and what they usually do (Thompson et al. 1991).

The study found most of the study participants have positive views and attitudes towards the integration of ICT tools; they showed an understanding of the value and meaning of ICT in education. They agree that ICT has a future in education and a positive impact on learning, cooperation and interaction between student and teacher.

However, the study found negative views among some headmasters and teachers who believe that the internet should be banned in secondary schools because it is contrary to their traditions and customs and the secondary school students are at a critical age. Such negative views may have been due to some factors preventing them from using these tools effectively, such as a lack of understanding about how the technology will be beneficial to the teacher (pedagogy

training) and uncertainty about school administration support (headmaster's role) and guidance (policy and strategies) (Bingimlas, 2009).

Negative views- The evidence from the literature confirms these findings. Oyaid (2009) found that the negative attitudes or perceptions of the headmasters towards ICT integration in education, or a low awareness about the advantages that ICT can offer teaching, resulting in a negative view, can slow the successful implementation of changes in the education system. In addition, the current study found a direct correlation between views and attitudes and acceptance of the use of ICT in education (Zhang and Dragana, 2008).

Several studies are compatible with these results which confirm that the key factors in effective ICT implementation are users' views and attitudes, which may either motivate or repel them from applying ICT tools (Al harbi 2014; Alshumaimeri, 2008; Saleh, 2008; Demetriadis et al. 2003).

Negative Student behaviour- both quantitative and qualitative results showed complaints from some school headmasters, teachers, students, as well as ICT directors, about some students' behaviour towards ICT tools, described as, *"Undesirable behaviour and they intentionally destroy the equipment."* which is a major cause of ICT malfunctions. To change this, the director of ICT suggested that, *"the responsibility should not only be with the schools, but also with the parents at home."*

It can be said, that changing of negative views about the use of the Internet within the school is crucial. Most excuses that were mentioned by headmasters, as well as teachers, related to the Internet being against customs and traditions. This is an obvious fallacy and is a strong indicator that some headmasters are still not familiar with the benefits of ICT use. The crux of the matter lies in the idea that the internet will change all the ways that they have been used to as teachers and headmasters. Any drastic change poses some threat and passiveness of students is an expressed consequence of this fear.

As can be observed, the use of the internet has revolutionised the Kingdom of Sadia Arabia and it has opened new opportunities for communication (Al-Saggaf, 2004). In addition, it has also encouraged participation in online communities, which is more active rather than passive, debunking the beliefs of some headmasters in the current study. There are also implications for online communication – previously, communication between men and women had not been encouraged due to tradition. Now, this is perfectly feasible. This allows them to develop more self-assurance, be more receptive to new beliefs and opinions, become more conscious of the

different kinds of people around them and become unconstrained and positive about the issue of gender. On the whole, Al-Saggaf's (2004) research asserts that there are positive effects in participation in online communities and these far outweigh the negative outcomes if there are any. This example points out the increased activity and participation that has been made possible through ICT.

Instead of restricting use of the internet, alternative solutions have been suggested; for example, from the qualitative results, Student [4] said: *"if every student has a personal computer with a personal user name and password, they can easily be aware of how students use the internet."* This was also suggested by the Virginia Department of Education (2007), who published guidelines relating to Internet safety instruction in schools. For example, the importance of learning via the Internet should be explained to both teachers and students. Furthermore, the latest internet security must be installed on school computers to monitor and filter student internet use (The Virginia Department of Education, 2007).

b) Impact of Culture, Religion and Beliefs

It was evident from the findings that religion and beliefs significantly influence the role and perceptions of Saudi schools staff. Most of the headmasters (61.6%) (Due to religious duty), banned the Internet in schools, some for fear of exposing students to material that was considered culturally inappropriate (85.5%). In qualitative results, two-thirds of the headmasters did this.

These results clearly indicate the influence of culture and religion on the use of the internet at Saudi schools and how they affect the way of thinking of the headmasters and teachers. The role of the government is to help headmasters and teachers to change misconceptions about using the internet at schools. Lack of clarification of policies and planning often leads to misconceptions and ignorance about ICT tools (Al-Sulaimani, 2010).

Godin and Kok (1991) researched personal norms, which can be defined as the role identity or the belief of how to act within the role, along with moral norms, which are feelings of personal responsibility.

These factors are clearly important in teachers' and headmasters' acceptance of technology (the internet), in relation to their need to be a role model, showing responsibility and high moral and ethical standards. If ICT implementation is aligned with these beliefs, then they are more likely to accept ICT usage. In a society such as Saudi Arabia, beliefs are not only tied to religion; they are also a way of life and relate to what people do, how they feel and

responsibility they take. This theory is crucial in advancing ICT implementation as it affects acceptability of ICT. Therefore, it is critical to take into account the moral norms in Saudi Arabia (culture and religion) in using the internet (Albirini 2006; Al-Sulaimani 2010).

c) Dissatisfaction towards The current ICT situation

The results showed a marked decrease in the level of satisfaction among most school staff and students towards several issues, such as the current situation regarding availability and use of ICT; support and supervision from the Ministry of Education; outcomes of using ICT tools in education; the negative attitude of some students towards ICT; the quality of ICT devices; training in ICT and time of training; development of the integration of ICT tools in schools; teachers' ICT skills; headmasters' and teachers' roles in ICT implementation; the ICT policy (objectives and clarity); collaboration between staff and the Ministry of Education and the Internet service in schools.

For the successful application of ICT tools, examining the satisfaction level among the school staff about the current situation and related factors is critical (Goyal et al. 2010). For example, Sparks (1994) confirms that dissatisfaction with the current situation is a strong reason to neglect the use of ICT in classrooms. Therefore, to make ICT implementation more successful, school staff should start with the identification of educational problems and factors behind them. Hence, the implementation of ICT should start from "dissatisfaction with the educational opportunities offered to [students] and a striving to do better" (Newhouse, 2002b, p. 5).

All above factors (negative views, cultural impact and dissatisfaction) may be linked with other factors such as lack of understanding about how the technology will be beneficial to the teacher (pedagogy training), uncertainty about management support (the headmaster's role) and guidance (policy and strategies), as well as the lack of training (Bingimlas, 2009) which is in line with the study findings (qualitative and quantitative).

What is important here is examining the level of satisfaction of ICT users as a factor affecting the implementation of ICT in schools. The study findings are in line with early research (Attar and Sweis, 2010; Kipsoi et al., 2012; Al Asmari, 2011), which suggested that degree of satisfaction plays a significant role in ICT implementation.

In conclusion, staff views and attitudes, culture and religion, as well as satisfaction about the current ICT situation, are identified factors that affect ICT implementation in Saudi secondary schools. The following section discusses the role of Saudi school headmasters in ICT implementation.

2- Headmaster's Role & Responsibilities in ICT

Ismail (2010) stated that one of the main responsibilities of the headmaster is to be aware of areas that require attention for the successful implementation of ICT in school. Therefore, in order to understand the headmaster's role in ICT, the study sought to examine some factors identified by the literature and the study's participants to be core roles and responsibilities of the headmasters to facilitate ICT tools in schools as follows.

a) Supporter, facilitator and collaborator

The results from the headmasters' interviews and survey showed positive support and encouragement among most headmasters towards ICT use in their schools, which is one of their roles in ICT implementation. This result is compatible with some studies' results. For example, most of them stated they are keen to make the classroom environment more enjoyable by integrating technology in all areas of the school (Schiller, 2003), making ICT resources available (Oliver & Herrington, 2003), encouraging teachers to use ICT and being keen to ensure the maintenance and repair of ICT devices, which reflect a positive learning environment (Wong, et al. 2008).

It can be argued from table 6.8 that the majority of the steps that should be taken for the implementation of ICT in schools by headmasters were carried out and they showed positive scores across most items.

However, the situation does not seem to be what they stated. It is obvious that the headmasters will not disclose information about their shortcomings in their duties. Therefore, it was necessary to listen to different points of view.

The study found mixed views among teachers and students on this issue. A low level of satisfaction with the headmaster's role can be observed from teachers' and students' results, such as the current situation of ICT in schools (64.2% of teachers are dissatisfied). In addition, the majority of them stated that some headmasters are not keen to adhere to safety requirements for students and teachers when they use ICT devices and do not follow up students'/teachers' complaints about issues they face through the use of ICT tools. Furthermore, as mentioned earlier, students' results showed that some of the headmasters do not allow them to use the Internet during the school day (62.5% agree).

These findings coincided with Albugami and Ahmed (2015b), who found various levels of encouragement and support given to Saudi class teachers to use ICT. About 54% of

headmasters often encouraged and supported the schoolteachers to use ICT in their classrooms, with 22% only doing it sometimes.

Regarding the headmasters' collaboration, the study found dissatisfied students. (Only 24.7% of students agree that the headmaster listens to their requests on ICT needs). Some students perceived that this collaboration was ineffectual and they describe themselves as sometimes caught between the headmasters and teachers. However, the importance of the headmaster's collaboration has been highlighted in the literature as a key to successful ICT implementation (Mulkeen, 2003; Schiller, 2003). This was also identified earlier in most developed countries' strategies (UK, U.S.A, New Zealand, Finland), which focused on the principle of collaboration between different parties (Heaviside and Farris, 1997; Kankaanranta, 2005).

Facilitators-The study found failure in some headmasters' role to be facilitators of ICT use; this appears in some areas. For example, the study results showed, although the headmasters' role is to encourage teachers to attend ICT training, however, not every teacher can benefit because, in most cases, the headmasters have control over the selection process, which is also reported as unjust. In this case the headmasters do not play a role as a facilitator. Another issue in the headmaster's role in facilitating ICT is to provide teachers with more free time for preparation. The results also showed time limitations and difficulties of scheduling adequate time for technology-oriented classes which is a significant barrier to the use of technological resources in teaching. This issue, as explained by most teachers, does not leave them enough time to apply ICT tools in classroom activities (Al-Alwani, 2005; Al Mulhim, 2014; Jones, 2004; Tearle, 2003).

This was confirmed by Al Mulhim (2014). In his results, most of the respondents in multiple interviews and studies reported that they needed more time to consult internet resources, prepare materials, or attend training (2014). Al-Alwani (2005) found that an overloaded schedule does not leave teachers enough time to apply audio-visual equipment in classroom activities. Thus, Al Mulhim (2014) concluded that administration of schools needs to encourage teachers to use ICT tools in the educational process by providing them with more free time for preparation.

In his study of the role of school headmasters as facilitators of change, Schiller (2003) referred to their functions of developing supportive environments, arranging training, providing consultation and promotion and monitoring and evaluating. Thus, headmasters should be regarded as the drivers of ICT implementation at the organisational (institutional) level.

b) Controlling and Assessing ICT usage

Most of the headmasters emphasized that they are doing their job to the fullest, in terms of evaluation of teachers who use/ do not use ICT, as well as control of all areas that support the implementation of ICT.

However, the situation is different; the study found differences in the duties of some headmasters in assessing teachers in terms of use of educational technology in their lessons. In general, teachers and students see a shortage in this duty. One of the main reasons for ineffective use of ICT may be because the majority of the headmasters do not pay attention to employ appraisal grades to urge teachers to use ICT or see limitations in their authority; as stated by one of them: *"my power is limited in this issue"* (Headmaster [1]).

This contradicts with what came in the education policy, which identified the headmasters' roles, by giving them all authority to supervise and follow up teachers' work, assessment of teachers' performance and control and monitor ICT implementation. It can be argued this could also relate to the weakness in their understanding of this policy.

c) Understanding of ICT policy and translating it into action

The study found a disparity in most of the headmasters' views, either in terms of understanding the concept or the objectives of the education policy as well as deficiencies in applying this policy in action. For example, some headmasters think that applying ICT policy in schools is not their responsibility; it is the supervisors from the Ministry of Education who are responsible. However, the majority of headmasters agreed that the education policy needs to be developed and, more importantly, that updated information should be circulated, by publishing it in the form of booklets or circulars providing easy access.

It is inevitable that such a lack of understanding of education policy, especially regarding the application of ICT tools, by some headmasters, is bound to lead to failure in many areas, which in turn could lead to failures in ICT implementation. This was confirmed by Almadhour: 'Unfortunately although the Saudi Arabian government has lots of funding, there is no clear strategic framework towards equipping ICT in schools' (2010, p.62).

Almaghlouth (2008), in his study of Saudi secondary schools, observed that most participants agreed that headmasters and teachers are ignorant of the ICT policy. The study showed that the lack of explanation of ICT policies had a negative impact because headmasters have to apply them without fully understanding, which is suggested as likely to result in not achieving the Ministry of Education's aims set for ICT in the country's education system.

d) ICT Skills

The results showed the moderate level of headmasters' ICT skills. The value of training was again identified as crucial. There were few who used ICT for personal use and official communication. Papi. & Sidr (2009) had urged that school leaders should set a good example for the staff and show their ability to use ICT tools, especially for educational purposes. In addition, the headmaster needs to demonstrate to the teachers how to follow suit. This could be ICT presentations in assemblies, meetings and for open days and promotion of effective use of ICT tools. However, the authors warned that if the headmaster only uses ICT for personal use, this would create a negative impact on the teachers.

It can be said that the headmasters' role in ICT, in the study results, can be described as not meeting the aspirations of teachers and students. Adding to this debate, Schiller (2003) suggests that an effective headmaster performs three roles to facilitate ICT in schools. They create and demonstrate a clear vision of the change, notably indicating the advantages of ICT implementation, establishing the expectations hoped to be achieved.

This study also found that headmasters need to oversee the scope of managerial aspects of the school functioning, thus demonstrating responsibility for finding financial resources to equip the school with digital tools, creating ICT infrastructure and developing and conducting training and educational sessions for teachers. Finally, headmasters should focus on the current concerns of the school community and the staff to ensure that making this change is an integral part of the education system, not just a separate intervention. This argument is possible if all the working conditions, both internal and external, favour the head teacher.

3- Teachers' Role & Responsibilities in ICT

This section aims to discuss the main teachers' roles in ICT in schools, identified from gathered data and the literature.

In qualitative and quantitative results, teachers' ICT skills varied. However, by looking at table 6.12, it can be assumed that most teachers are unskilled in some important and popular ICT tools in education (e.g. interactive whiteboard; only 30%; and projectors; only 20.6%), which means limited ability to activate these tools. The internet (if available), was mainly accessed for personal media and not for educational purpose.

ICT skills were limited in dealing with the Department of Education or Ministry of Education electronically, communicating with staff and students through email, which means that the communication and collaboration between different parties, in teachers' functions, are limited.

Finally, their ability to fix some computer problems and other ICT devices were very low (18.2%). This explains the frequent breakdowns of ICT tools in schools.

The available literature confirms teachers' skills are highly correlated with ICT implementation (Koehler, Mishra, Yahya and Yadav, 2004; Koehler and Mishra, 2005; 2008; 2009). Oyaid (2009) explained that inadequate ICT skills create anxiety in teachers and prevent them from applying technologies. This author also presented the results of the research showing that some teachers may feel overwhelmed by the fast development of ICT and that they fear students may be more confident in ICT use than they are.

Therefore, many educators believe that the success of the development of teachers' technological and educational skills goes back to their desire and self-motivation. Hence, the role of the teachers in ICT application starts from developing their skills and raising their awareness about ICT's importance in education (Burkhart and Older, 2003; Bingimla, 2009).

Study analysis of the relationship between the extent of ICT use and motivation, has shown that the most significant motivation factors relating to using ICT were: perceived ease to use ICT; difficulties experienced in using it (skills); satisfaction level with the current situation; level of availability with ICT resources and whether using ICT in teaching is considered to be interesting and enjoyable. In referring to Ajzen's theory of planned behaviour, it can be deduced that the negative factors amongst these have been sufficient to deter most teachers from using ICT.

The results showed most students, headmasters and ICT directors saw ICT implementation, primarily, as the responsibility of teachers. However, application of ICT in classrooms was limited. In this matter, teachers cast the blame on the Ministry of Education and the headmasters. They justify this by the presence of obstacles preventing them from using ICT tools in their lessons, including lack of training and experience in using ICT, scheduling problems, lack of appropriate space for the use of ICT, lack of headmaster supervision and lack of incentives.

These findings agree with the available literature that highlights that multiple factors impact ICT application by teachers in the classroom. Various studies have reported insufficient use of ICT by teachers in the classroom (Cuban et al. 2001; Wonzeny et al.)

Although there were positive views (in the results) about the importance of ICT in education, it can be clearly seen that there are compelling differences in the opinions of the various parties concerning responsibilities in ICT implementation. Thus, instead of cooperating and sharing

responsibility towards a shared vision of the successful implementation of ICT, they assign blame to each other. The need for effective leadership is critical to ensure support and conditions as well as involvement of various parties to ensure tasks are carried out (Aabed, 2006).

Again, it can be said from the study findings and supporting literature that the previous factors are related to each other. For instance, the role of teachers in the implementation of ICT is linked to the existence of these tools in the first place, with training and, above all, personal desire to activate these devices, with a supportive administration.

5- Policy and strategy

The aim of this section is to understand the role that the Saudi government plays in facilitating ICT implementation in schools. To get insight into this, the study discusses findings on the following themes.

a) Clarity of the Educational Policy

The study found, in both qualitative and quantitative results, ambiguity in ICT policy. There is no clear and direct guidance towards the importance of activating ICT tools in education. All that has been accessible are public circulars or information on the Ministry of Education website, which indicates the need for the adoption of e-learning. The call for clarity of the education policy, especially the roles of headmasters and teachers, is critical. Al-Sulaimani (2010) believes that a lack of clarification in policies and planning often leads to misconceptions and ignorance about ICT tools. This is compatible with many studies conducted in Saudi Arabia, which have called for clear policy planning in terms of ICT implementation in schools.

For instance, Oyaid (2009); Almadhour (2010); Almalki & Williams (2012); Al-Harbi (2014) and Al-Oteawi (2002), revealed that the Saudi government needs to develop an effective strategy for ICT in education and to implement it in practice. Almadhour (2010) concluded in his study, 'Unfortunately although the Saudi Arabian government has lots of funding, there is no clear strategic framework towards equipping ICT in schools' (p.62).

Alsulaimani (2012) in his study " *What Impedes Saudi Science Teachers from Using ICT*?", found 76% of participants agreed that there is no clear strategy for ICT implementation in schools and considered this a barrier to integrating ICT into their curricula. In this study, 66.9% of teachers agree that the ICT policy is not clear and 71.4% of headmasters believe that the

Ministry of Education has not developed clear goals and instructions on ICT implementation. This leads to the conclusion that the lack of a Saudi educational policy is one of the main factors that hinder ICT implementation in schools.

To sum up, the ICT policy is weak and needs to be developed at all levels and this, in turn, leads the study to deduce that the weakness of clarity in education policy is one of the factors that hinder the implementation of ICT in Saudi secondary schools.

b) Support, Encouragement and Collaboration

The current study's results showed that there was a disjointed collaboration between the Ministry of Education and other stakeholders. The collected evidence indicated that the Ministry of Education did not provide sufficient support and encouragement for schools in terms of ICT implementation. Such a conclusion was based on the collective agreement between the views of teachers' interviews and the headmasters' and teachers' survey, which suggested that the lack of Ministry of Education support has a negative influence on ICT implementation. This sentiment is well amplified by Bingimlas (2009), who argues that the integration of ICT in the classroom needs to address the barriers that may hinder the success of the various processes involved and that this is one of the government's major roles. Roblyer and Doering (2010) emphasise that the implementation of ICT is most successful when there are supportive processes in place.

Al-Draiby et al. (2010) stated that the current ICT policies and rules in Saudi Arabia pose a major challenge to the development of ICT due to the complexity of the upper levels of the organization represented by the Ministry of Education. Thus, the Ministry of Education needs to commit to its share of the planning process by engaging stakeholders in different areas that need development in ICT. In addition, the administration of the education system in Saudi Arabia is highly centralised. All educational policies are subject to government control and supervision by the Supreme Council of Education as well as the curricula and textbooks being uniform throughout the Kingdom of Saudi Arabia (Alzaida, 2008). This is crucial as reviewing any existing ICT policies means there are key stakeholders to involve and this needs to be factored into the implementation framework.

The digital strategy for Irish schools aimed to 'Lead by example' through collaboration. Prior to introducing ICT in the education system, the base-line data was collected on the current use of ICT by teachers and schools, after which a public consultation was organised by stakeholder groups, including individuals, organisations and school students themselves, with their

resulting views and feedback, alongside international research, forming the content of their strategy (Department of Education and Skills, 2015).

c) Follow-up, supervision and technical support

The results showed a lack of follow-up and supervision are problems hindering the adoption and learning of ICT in Saudi secondary schools, highlighted by Hakami et al. (2013). Almalki & Williams (2012) suggest that in spite of developing numerous strategies for promoting ICT learning in secondary schools, the Ministry of Education has failed to put in place strategies for ensuring that learning programs are deployed and effectively followed.

The results of this study showed resentment among most of the headmasters and teachers about the role of the Ministry of Education in terms of supervision and follow-up of the implementation of ICT in schools. 50% of headmasters were not satisfied with this issue. Most teachers also indicated that the support from Ministry supervisors is weak. One of the teachers said *"For two years I haven't seen a single supervisor of educational technologies in my school"* Teacher **[1]**.

The literature showed that the Ministry of Education has the highest number of failed projects (498 projects), including ICT projects. It seems that the failure of these projects related to the lacking of the policy of the Saudi Ministry of Education and their role in follow-up and supervision (Al- Juhani, 2014). Adding to this debate, Albugami and Ahmed (2015a) have highlighted that supervisory support is a critical factor for successful ICT implementation. This lead the study to suggest the shortfall in this factor as the cause of limited ICT implementation.

Technical Support **-** The number of devices out of service that have been observed in some schools was shocking. There are a huge number of devices neglected in the computer labs, school stores, or even in the classrooms, which have not worked for a long time (see picture 5.2). Based on the evidence collected during the interview with the director of an ICT department, as well as some school headmasters and teachers, the study was able to determine four factors hindering the technical support path. Limited technical workers (only four), a limited number of supervisors compared to the huge number of the schools (one supervisor to 300 schools), as well as the lack of spare parts. Finally the limited maintenance skills among the school staff in ICT (only 18.2% of teachers and 10.8% of headmasters are able to fix some ICT technical problems).

The evidence from most employed data collection revealed dissatisfaction with the technical support. The Ministry of Education again failed to find a clear strategy in providing a sufficient

number of technical workers and supervisors as well as tools for high performance and quality of services. These results are compatible with some studies' results conducted in Saudi Arabia (Almohaissin, 2006; AL-Harbi, 2014; Ghamrawi, 2013).

Al-Sulaimani (2010) examined the importance of teachers in integrating ICT into Science teaching in Saudi Arabia; the study concluded that insufficient technical support for using ICT was of immediate concern to 85% of teachers. Similarly, Almaghlouth (2008) reported technical problems are one of the major barriers of ICT in Saudi schools. This lack of technical support can be explained by the on-going costs of the ICT technologies in schools (Al-Sulaimani, 2010). Kozma (2011) stated that teachers will have no interest in the use of ICT if they feel they will face technical problems that need a long time to fix.

According to Becta (2004), *"if there is a lack of technical support available in a school, then it is likely that preventative technical maintenance will not be carried out regularly, resulting in a higher risk of technical breakdowns"* (p. 16). Therefore, equipping schools with ICT resources with no technical support, any technical problems will decrease that access until the problems are resolved. It is argued that there is a relationship between the lack of technical support and teachers' access to ICT equipment at schools (Becta, 2004). Balanskat, et al. (2006) proposed that to avoid such problems, the Ministry of Education should pay attention to providing sufficient technical support services as well as maintenance contracts for ICT in order to guarantee that ICT tools are working effectively. In addition, Lim and Khine (2006) suggested that schools should request technical assistance in order to troubleshoot ICT problems and fix them.

d) Policies translated into action

The quantitative results showed 71.4% of the headmasters and 75.2% of teachers believe that the ICT policy is just theory and has not been applied in practice, indicating that the Saudi Ministry of Education failed to translate its policy into action.

Despite the noble aims of this policy, regarding the ICT programs, the government still face many problems to translate this plan into action and to achieve the objectives of its ICT projects. This is axiomatic: if the education policy is not clear, it is expected its translation into action will be weak.

The previous results showed general weakness in many areas that are important for ICT implementation, such as lack of ICT policy objectives, lack of working in partnership, lack of support and encouragement, lack of follow-up and supervision, lack of staff training and lack

of technical support. If these critical factors are not effective at policy level, implementation at school level will continue to be impossible. These results are compatible with Simpson (1998, p. 471) who says *"the development of policies and strategies without translating them into action is a waste of time and effort."*

The results showed that the Ministry of Education has not provided a clear strategy to motivate teachers to use ICT and to attend training programs. There were gaps in training and supervision and technical support was insufficient. Further maligned is the Ministry of Education's lack of administrative stability. For example, from 2013 to 2015, four ministers have run the Ministry of Education, which caused the failure of a number of projects. It also contributed to the lack of stability and clarity of the future vision of the ministry, which led to weakness in ICT Policy and strategies to translate it into action (Al Riyadh, 2015).

This result is compatible with some studies. Robertson & Al-Zahrani (2012) indicate that the failure in translating policy into action is due to many factors, such as financial support, culture, environmental shock and lack of teacher preparation and training for technology use. In addition, funding constraints, overlapping programs, technological change and cultural distrust of ICT have frustrated the intentions of the Saudi Ministry of Education to integrate ICT into the secondary school curriculum (Al-Sulaimani, 2010).

5- Shortcomings in ICT as a subject

The majority of the participants acknowledge that the current content of ICT is weak, as most of the students' knowledge of the subject is greater than the course content, resulting in a lack of motivation. The results found an urgent need for development in ICT. Students also reported outdated programs (software), which were incompatible with some of the ICT content. Further issues of concern were that most computers were not regularly upgraded and most schools were using old software. Most headmasters as well as ICT directors reported that there are serious deficiencies in teaching the subject of ICT.

In this issue, Almalki and Williams (2012) and Alshmrany et al. (2014) stated, although ICT is a mandatory subject in all Saudi secondary schools, it has not yet been fully activated as a taught subject. The current situation of ICT as a subject has faced significant criticism. For example, Bin-Shewaia (2014) observes that ICT subject at all levels in Saudi schools is still deficient and needs development. It is not compatible with modern technology. It is just about basic computer skills in most of its content and this does not accommodate young learners who

are interested in various technology fields. Alshmrany et al. (2014) argue that about 30% of the content being taught in secondary schools is out of date.

It can be concluded, that there are clearly shortcomings in the subject of ICT, with most of the students' knowledge of the subject greater than the course content. Furthermore, the hardware and software are incompatible with what is currently being taught. This can, additionally, be considered an influential factor in the effectiveness of ICT implementation.

6- ICT Resources

a) Material

Another role of the government is to provide a sufficient number of ICT tools in schools. The study found variations in ICT tools allocation for schools and dissatisfaction about the quality of some of these tools. Two-thirds of survey participants, as well as all interview participants, acknowledged that there is an insufficient amount of ICT tools in their schools. In addition, the study found a lack of a sufficient number of computers and lack of access to the Internet in most schools.

Some students reported during the interviews that they were asked to bring in their computers (anyone who has a laptop) because either the ones in school were broken or there were not enough available to use. This was very common during exam periods.
Accordingly, the lack of ICT tools is discussed from two angles: availability of ICT tools and the quality of these tools.

Regarding the availability of ICT materials, the study found a clear disparity in the availability of ICT tools from one school to another. Some schools have adequate amounts to the extent that the surplus stays in the school store, other schools have a few of these tools. The study found this is because of two reasons.

First, maldistribution, where there is a lack of a clear mechanism for the distribution of ICT devices had created some dissatisfaction between the school headmasters. Both headmasters and teachers reported an unfair distribution of ICT resources to schools and there is a need for more clarity in the procedures, which turned out to be caused by the lack of a Ministry of Education database, to find out the real needs of schools. This issue was confirmed in the literature by Wallet (2014) as one of ICT implementation barriers in education.

The second reason is the role played by the exchange of interests and favouritism, which play a role in the distribution of these devices, it has been confirmed by the high agreement of the participants, as well as the director of ICT acknowledging the existence of favouritism.

The participants' emphasis on this issue was very interesting. Favoritism and nepotism were discussed extensively in the literature and linked to the nation culture and beliefs, which also have a role in the lack of justice and equality (Aldraehim, et al. 2012).

However, this issue is very important for the current research too, as no study, in the Saudi context, had examined the role of favoritism in providing schools with ICT tools, as well as the effect of maldistribution of these tools in depriving many schools of their right to have these tools, which in turn led to failure to implement the technology in many schools, wasting public money. Nepotism and maldistribution are factors to be taken into account when proposing the ICT strategic approach.

In regards to the quality of ICT tools (quality of performance), the collected evidence showed nearly one third of participants dissatisfied with this issue. This was explained by the headmasters and teachers as related to the wrong choices for some devices; without examination, in advance. Some devices also seem to be complicated in use; even the supervisors have no idea how to use them.

In reviewing the literature, it was agreed that one of the Ministry of Education's basic roles is to monitor the performance of schools and the extent of the employment of these devices in education (OECD, 2004; Hartwell et al., 2003) and, in addition, to reduce indiscriminate spending when buying new hardware or carrying out maintenance (Cairncross and Poysti, 2003). Furthermore, it should be taken into consideration that there could also be a failure in the role of some of the headmasters, when, in cooperation with the Ministry of Education, they provide incorrect information about their genuine needs. This leads to an important point, that the requirements of each school and the quality of some ICT tools are not currently dealt with on an equal basis, which is clearly connected to the issue of the lack of collaboration, lack of translating ICT policy into action and lack of follow-up and supervision (Oyaid, 2009; Almadhour, 2010; Almalki & Williams, 2012; Al-Harbi, 2014and Al-Oteawi, 2002).

b) **Human Resources (qualified teachers)**

The study found that a lack of training is the most cited factor which prevents ICT implementation in schools. All the headmasters and teachers, as well as the ICT directors, acknowledged that ICT training is a necessity. The study results, in general, show weakness in ICT skills among headmasters and teachers. For example, Headmaster **[3]** commented, *"About 90% of my teachers aren't qualified in ICT (skills), most of them don't even like training which in turn makes the implementation of ICT poor"*.

There is currently an issue of a lack of ICT skills and experience amongst some teachers and headmasters, which is reported to affect confidence. For example, the results showed many teachers unwilling to even try to use ICT tools due to a lack of familiarity and knowledge and lack of enthusiasm to use these tools in their lessons. The study discusses this issue from two angles; ICT skills and ICT pedagogy.

Regarding teachers' ICT skills, most study' participants agreed that the lack of ICT training is a cause of poor ICT skills. This weakness is especially common with some ICT tools (projectors and interactive whiteboard). Most of the headmasters, teachers and ICT directors stressed that skilling teachers and administrators should take place before teachers are accepted in their teacher jobs and that skilled teachers should be in a position in schools before ICT tools are provided.

On the other hand, the study found that pedagogy training among teachers is virtually non-existent. The results showed need for pedagogy training in order to qualify teachers to ensure the effective application of these technologies. The results also show that almost 46% of teachers are not keen to attend ICT training. Although the government has the responsibility of developing teachers' skills in using ICT, this is not happening in reality and even when training is available, not every teacher can benefit because, in most cases, the headmasters have control over the selection process, which is also reported as unjust.

This was explained by some of them and, in line with several studies' results, is related to the lack of training time (Becta (2004; Bingimlas, 2009), lack of quality training programs (Jones, 2004) and could be related to the lack of incentives and encouragement to attend such programmes (Infante and Nussbaum, 2010).

This was mainly explained as a result of poor planning again by the Ministry of Education and the headmasters, where teachers had to use their own time to train, which did not favor families. These findings are in agreement with Jones (2002), who proposed that pre-service teacher training courses in ICT use should focus, at the very least, on three aspects: the individual skills that link to professional use; administration and organisational use; and techniques for effective teaching and learning practices. The results show that the training, which is provided by the government, is still at an early stage and clearly needs further development, as the quality of these programmes does not currently meet the school staff requirements.

Furthermore, the government should pay more attention to the teachers who are reluctant to attend training. Available data shows the need to address the issue of human resources.

Newhouse (2002) emphasizes that the availability of ICT resources with financial resources, but without human resources (skills or knowledge of teachers) to implement ICT in the classroom, implies there is unlikely to be a positive outcome. Newhouse's framework also emphasizes the thinking of both Lim and Khine (2006), who point out that the availability of resources, without technical support results in difficulties in ICT integration at the school level.

As pointed out in the literature review, a number of theories have been developed by various scholars (Davis, 1986; Newhouse 2002). Davis (1986) gives one of the core theoretical frameworks that can be used to understand the acceptance of ICT, based on the in-depth thoughts of the users and essentially explains the link between the technologies in question to the acceptance of it into educational systems. The TAM model provided the means by which ICT's ease of use can be correlated with how much people accept this into the system of learning and teaching.

c) Financial Resources

One of the dilemmas facing Saudi secondary schools is the lack of financial resources, which affects ICT implementation in terms of maintenance as well as in providing some simple supplies such as printer ink. The study found that some school headmasters and teachers are paying from their own pockets in order to pay for janitors' salaries, maintenance and incentives for teachers as well as students, etc. This is again due to no clarity in policy around resource management. The findings show that the Ministry of Education's support in this matter is limited and does not meet the real demand of schools.

However, there is a fallacy where most of the headmasters and teachers believe that the massive education budget should provide all the requirements of ICT in schools. The results showed, according to the director of the computer department, that the situation is not so, as financial needs have varied over the years, while the budgets remain the same. He said *"Even though there is a huge budget from the government allocated to education, this doesn't mean all or most of it goes to the ICT department. Furthermore, a large part of this budget goes to salaries, the construction of new schools and the rest is for school equipment, educational supplies and training programmes."*

It can be argued that the provision of financial resources is the responsibility of the government, represented by the Ministry of Education. This issue has been identified in the literature as an obstacle to the application of ICT (Robertson & Al-Zahrani, 2012; Newhouse, 2002; Alzaida, 2008; Schiller, 2003).

7- Creating an attractive learning environment

In this section, an attractive learning environment means providing proper buildings with all ICT facilities (spaces, safety means and ICT infrastructure).

Providing a proper physical environment is another role added to the Ministry of Education responsibilities. It has been revealed by school staff, students and ICT directors, and it was supported by the survey results, that the school environments are still inappropriate for the use of ICT tools and do not promote learning and teaching.

The majority of students are concerned by a lack of facilities, health and safety issues, overheated computer labs as well as unsatisfactory basic equipment, such as tables and chairs. Another major issue found to affect the issue of ICT implementation is the growing number of students. Some old school buildings cause challenges regarding the capacity and size of classrooms originally designed before the introduction of the ICT programme. Teachers similarly stressed there is a lack of rooms to store resources, meaning teachers often have to carry equipment wherever they go. The study found some computer labs without the facilities to connect ICT tools.

The condition of the classrooms, as well as poor ventilation, is a continuous internal issue. There is an urgent need to upgrade the infrastructure to meet the needs of new technology. Student **[3]** described the situation in his school, saying he cannot blame the teachers for their lack of engagement because *"the computer lab's very old and there are very few computers."*

The study also found buildings are not equipped to accommodate the electrical requirements and there are risks of error, so teachers have to take many precautions. Illustrating such challenges, teacher **[1]** commented, *"We're the only country in the world that uses electricity with 110 and 220 volts and some devices require 110 volts, so when the teachers mistakenly use 220 volts with a device which needs 110 volts, it is bound to burn".* Issues of infrastructure that should be addressed include plugs, room size, ventilation as well as equipment, desks and chairs.

According to Almalki and Williams (2012), approximately 44% of the secondary schools in Saudi Arabia do not have the necessary ICT infrastructure, an aspect that significantly hinders adoption of ICT as a compulsory subject. The authors further indicate that a significant proportion of the schools that are equipped with ICT infrastructure use outdated equipment. These views are supported by Alshumaim and Alhasaan (2010) who identified that lack of ICT facilities and infrastructure hindering ICT integration in the classroom.

7.2. SUMMARY AND MAIN FINDINGS

The challenges in qualitative and quantitative results have been identified as internal and external factors. Management of barriers is crucial and without addressing these challenges, it is impossible to succeed in ICT implementation in secondary schools in Saudi Arabia. The results showed a lack of ICT skills among most headmasters and teachers and there are clear deficiencies in their roles in ICT implementation. The identified challenges are not just limited to skills, but also to policies, resources, infrastructure, technical support and, more crucially, attitudes and behaviour. Culture and religion also play a big role. In addition, the findings shows barriers include: the growing number of students, lack of supervision from the Ministry of Education, lack of ICT tools and lack of ICT training programs. Other barriers included lack of incentives and motivation and lack of teacher awareness about the importance of ICT in education. There were also lack of financial resources; lack of time available to use ICT; lack of suitable infrastructure; lack of maintenance; lack of appropriate space to use; lack of classroom management skills; lack of confidence in the ability to use ICT; and lack of understanding of ICT policy.

Ambiguity of the education policy, especially regarding the application of ICT tools, is bound to lead to failure in many areas. In addition, although this policy aims to transform education from traditional teaching to e-education, the provision of ICT tools in schools is often insufficient. The study shows lack of sufficient ICT resources, lack of computer facilities and an unattractive learning environment has limited the implementation of ICT.

The deficiencies in the ICT departmental budget and weakness in subject content are all barriers to ICT implementation. There is clearly a need for development in this area. The study found deficiencies not only in ICT skills training, but also in pedagogical training and supervision. Monitoring of the performance of schools and the extent of the employment of these devices in education was not in place. Dissatisfaction with the lack of technical support, supervision and follow-up related to the limited number of supervisors was a big concern. In addressing challenges. The government should propose a framework to improve ICT implementation. As the fourth objective of this study focuses on identifying the factors that affect ICT implementation in Saudi secondary schools, relevant literature from chapter two and three will be summarized and presented in the following chapter.

The table below summarizes the level of agreement between evidence collected from qualitative and quantitative results in this chapter.

Table 7.1: Key of codes

Keys:	Evidences collected from	Keys:	Evidences collected from
H[in]	The headmasters' interviews	**D2[in]**	The computers director' interviews
T[in]	Teachers' interviews.	**H[S]**	The headmasters' surveys.
S[in]	The students' interviews.	**T[S]**	The teachers' surveys.
D1[in]	The ICT director interviews.	**S[S]**	The students' surveys.
√	Implemented.	**X**	Not implemented.
New criteria emerged from the data			

Table 7.2: Level of agreement between qualitative and quantitative results

1	**School Level**		**H [in]**	**T [in]**	**S [in]**	**D1 [in]**	**D2 [in]**	**H [S]**	**T [S]**	**S [S]**
	Criteria related to school culture	Positive views towards integration of ICT in education	√	√	√	√	√	√	√	√
		Satisfaction towards current ICT situation at schools	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**
		Some negative students' behaviour cause the limitation internet use at the schools	√	√			√	√	√	
		Culture and religion play a role in using the internet in Saudi schools	√	√	√	√	√	√	√	√
		Some negative students' behaviour is cause of most ICT tools malfunction	√	√	√		√	√	√	√
2	Criteria related to the headmaster's roles and responsibilities in ICT	Adequate collaboration in terms of ICT implementation	**X**	**X**	**X**			**X**	**X**	**X**
		Internet access in school at all the time	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**
		Support and encouragement in ICT	√	**X**	**X**			√	**X**	**X**
		Availability of school strategies	√	**X**		**X**	**X**	√	**X**	
		Assessment of teachers' ICT usage	√	√		**X**	**X**	√	√	
		Controlling, monitoring and supervision	√	**X**	**X**	**X**	**X**	√	**X**	**X**
		Cooperation in the disclosure of real needs of ICT tools					**X**			
		Adequate response to teachers and student enquiries related ICT issues	√	**X**	**X**			√	**X**	**X**
3	**School Level**		**H [in]**	**T [in]**	**S [in]**	**D1 [in]**	**D2 [in]**	**H [S]**	**T [S]**	**S [S]**
	Criteria related to teachers' roles and responsibilities in ICT	Attending ICT training	**X**	√		**X**	**X**	**X**	**X**	
		Involvement of students in ICT practices	**X**	√	**X**			**X**	**X**	**X**
		Adequate pedagogy training	**X**	**X**		**X**	**X**	**X**	**X**	
		The use of ICT tools that meet the courses' contents and students' needs	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**
		Collaboration with school staff	**X**			**X**	**X**	**X**		
		Employing ICT in classrooms			**X**			**X**		**X**

4	Government Level		H [in]	T [in]	S [in]	D1 [in]	D2 [in]	H [S]	T [S]	S [S]
	Criteria related to 1- Clarity in ICT policy	Clarity in the Ministry of Education policy that addresses ICT	X	X			X	X	X	
		Incentive and encouragement	X	X		X	X	X	X	
		Adequate authority of the headmasters in controlling ICT implementation	X			X	X	X		
		Adequate budget to facilitate ICT in schools	X			X	X	X		
		Availability of resources to carry out ICT policy	X	X		X		X	X	
		Clear allocation of responsibilities in ICT policy	X	X			X	X	X	
		Adequate regulations that address rewards	X			X	X	X		
		Involvement of teachers and students in the ICT development process	X	X	X	X	X	X	X	X
		Availability of policy that addresses evaluation of ICT	X	X		X	X	X	X	
		Career progression based on ICT skills development	X	X	X	X	X	X	X	X
		Adequate support to schools' activities related to ICT	X	X		√	√	X	X	
		Adequate cooperation between ICT departments and schools	X			X	X	X		
		Adequate strategies to ensure ICT acceptance of new teachers	X	X		X	X	X	X	
			H [in]	T [in]	S [in]	D1 [in]	D2 [in]	H [S]	T [S]	S [S]
	2- Technical support and Maintenance	Adequate technical support for ICT in schools	X	X		X	X	X	X	
		Availability of sufficient designated technical support centres	X	X		X	X	X	X	
		Adequate cooperation in the time of repair and maintenance	X	X		X	X	X	X	
		Technical centre equipped with adequate spare parts				X	X			
		Sufficient number of technical workers				X	X			
	Government Level		H [in]	T [in]	S [in]	D1 [in]	D2 [in]	H [S]	T [S]	S [S]
	3- ICT training	Adequate time for training	X	X		X	X	X	X	
		Staff training precedes the application of ICT	X	X		X	X	X	X	
		Incentives to attend ICT training	X	X		X	X	X	X	
		Qualified ICT trainers		X		√	√		X	
		Availability of training courses schedule , in ICT, for school staff in advance	X	X		X	X	X	X	
		Adequate ICT training programmes that meet the needs of school staff	X	X		√	X	X	X	
	Government Level		H [in]	T [in]	S [in]	D1 [in]	D2 [in]	H [S]	T [S]	S [S]
	4- Supervision and follow-up	Adequacy of ICT supervisors	X	X		X	X	X	X	
		Adequate cooperation between ICT departments and schools	X	X		X	X	X	X	
		Qualified supervisors in ICT	X	X				X	X	

		Adequate number of supervision sessions	X	X		X	X	X	X	
		Use of principle of reward and discipline	X	X		X	X	X	X	
5	**Government Level**		**H [in]**	**T [in]**	**S [in]**	**D1 [in]**	**D2 [in]**	**H [S]**	**T [S]**	**S [S]**
	Criteria related to ICT subject	Adequate ICT content for the students' needs and the labour market	X	X	X	X	X	X	X	X
		Compatible with modern applications	X	X	X	X	X	X	X	X
		Needs development	√	√	√	√	√	√	√	√
6	**Government Level**		**H [in]**	**T [in]**	**S [in]**	**D1 [in]**	**D2 [in]**	**H [S]**	**T [S]**	**S [S]**
	Criteria related to ICT resources	Sufficient number of ICT tools	X	X	X	X	X	X	X	X
		Favouritism plays a role in the distribution of ICT tools to the schools	√	√			√	√	√	
		Availability of ICT databases					X			
		Inequality due to maldistribution of ICT tools between schools	X	X	X	X	X	X	X	X
		Adequate internet service	X	X	X	X	X	X	X	X
		Computer labs equipped with adequate hardware and software	X	X	X	X	X	X	X	X
		Quality of ICT tools	X	X	X	X	X	X	X	X
7	**Government Level**		**H [in]**	**T [in]**	**S [in]**	**D1 [in]**	**D2 [in]**	**H [S]**	**T [S]**	**S [S]**
	Criteria related to school environment	Acceptance of students in line with the capacity of schools	X	X	X	X	X	X	X	X
		School buildings are in pace with integration of modern technology	X	X	X	X	X	X	X	X
		Safety means in using ICT tools	X	X	X		X	X	X	X
		Labs set at optimum temperature to prevent damage to equipment	X	X	X	X	X	X	X	X
		Adequate ICT infrastructure	X	X	X	X	X	X	X	X
		Adequate spaces to use ICT tools	X	X	X	X		X	X	X
		Adequate spaces to keep ICT tools (storages)	X	X	X		X	X	X	X
		Adequate periodic maintenance	X	X	X	X	X	X	X	X

CHAPTER VIII: DISCUSSION, CONCLUSION AND RECOMMENDATIONS

8.0 INTRODUCTION

The aim of this chapter is to discuss the study outcomes in light of its five objectives, in order to propose a strategic approach for successful ICT implementation in Saudi secondary schools (as the main aim of this study). It is divided into five sections, the first of which discusses the accomplishments of the study objectives. This is followed by the study's main findings and conclusion. At the end of this chapter, the study's limitations, contribution to the knowledge and recommendations are presented.

8.1. DISCUSSION OF THE STUDY OBJECTIVES

The previous chapter discussed the main findings of the qualitative and quantitative results. This section aims to discuss the study's findings in the light of its five objectives.

8.1.1. Discussion the study's first objective: *To develop an understanding of the definition of ICT and its historical development to date*

Without a clear understanding of the meaning, nature and importance of ICT tools, it becomes difficult to achieve the objectives of integrating them in education. Therefore, a clear definition of ICT in education is needed, as well as how its use is crucial for several reasons: for educational policy-makers to get the desired outcomes; for teachers who are the main target to use them; as well as for the current study to find out to what extent Saudi educationalists understand the objective of integrating ICT tools into education. To achieve this, it was necessary to examine ICT's historical development and to capture ICT characteristics and features that have developed over time and their related practices, which in turn helped the study to review all ICT definitions during its historical development, which has encompassed four revolutions.

Despite this development, the literature revealed that scholars do not agree on a single definition of ICT tools in education. For example, some of them restrict it to the use of a computer, while others believes it just relates to a branch of engineering, dealing with the use of computers and telecommunications devices to store, retrieve, transmit and manipulate data. Other educators have defined ICT tools as hardware, software and mediators, such as technologies that allow communication through radio, interactive teaching, teleconferencing, etc.

However, the findings from the literature showed no significant difference in the definitions of ICT tools. Therefore, the concept of ICT that is currently used refers to the diverse set of technological tools and resources (hardware or software) used to communicate and to create, disseminate, store and manage information (data). Accordingly, and to fill the gap in this objective, the study defines ICT tools, in education, as an umbrella that includes any technology equipment or application (hardware and software) used to store, manipulate, convert, protect, send and receive data. For example, computers, networks, televisions, radios, cellular phones, satellite systems, interactive whiteboards, projectors, mobile phones, recorders, digital, cameras and the internet.

8.1.2. Discussion the study's second objective: *To examine theories, policies and strategies used to implement ICT in education in order to build a conceptual framework that reinforces the criteria for ICT implementation in Saudi secondary schools.*

These conceptualize the way ICT is implemented within education, providing frameworks and policies that Ministries of Education tend to use and implement in many countries considered in chapter 2. In terms of filling the gap in this objective, in table 2.3 the current study shows exemplified numerous common strategies and policies that developed and developing countries across the world have used to implement ICT into their education systems.

From the literature, there are different policies and strategies across different countries. For example, the USA, New Zealand, Ireland, Finland and Jordan use collaboration and cooperative strategies. In this study, participants show that there is poor collaboration between the schools and the Ministry of Education, as well as within the schools. Meanwhile, investing in quality of ICT tools and infrastructure is core to the United Kingdom, Australia, Egypt, Taiwan and the USA. The results show that Saudi Arabia needs to invest in better quality ICT infrastructure and ICT tools as most participants affirm the gap.

Most countries have their core policies and strategies linked to advancing teachers' development, ensuring that teachers are well prepared and knowledgeable about ICT. These include Taiwan, Chile and India, which reinforce acquisition of human capital, as well as Australia, which has invested in teacher training. In Saudi secondary schools, most teachers are not well prepared and lack training in ICT. This not only affects their confidence in integrating the ICT tools in learning, but also affects their attitudes and motivation.

Other strategies in Australia, New Zealand, Egypt and Chile have core elements based on increasing online learning. In Saudi secondary schools, however, students were denied access

to online resources and the internet is regulated or forbidden in most schools. The Saudi strategy aims to control what the Saudi Arabian education system may describe as outside western influence and aims at preserving the culture of the Saudi community. It does, however, derail online learning, research and connectivity to the outside learning world.

To sum up, the Saudi government can learn from all strategies that enhance collaboration, availability of ICT and investing in ICT infrastructure, as well as building the capacity of teachers and restructuring the system, as evidenced in the Indian strategy. Results from this study show more needs to be done to create an effective and efficient ICT strategy in Saudi Arabia.

On the other hand, as pointed out in the literature review, a number of theories have been developed by various scholars. One of the core theoretical frameworks that can be used to understand the acceptance of ICT is the Technology Acceptance Model (TAM). This model provides the means by which ICT's ease of use can be correlated with how much people accept this into the system of learning and teaching. The benefits of ICT, as analyzed in chapter 2, make the acceptance of ICT easier if they are clearly pointed out. Results show that in Saudi Arabian secondary schools there is a clear shortfall in the use of the benefits of ICT to motivate users.

This is particularly a problem for teachers with a lack of skill or headmasters who are themselves unaware of the benefits of ICT. The study results show that the students are willing and prefer learning when ICT is integrated. There is therefore a need to bridge the gap between teachers', headmasters' and students' ease of use and acceptability of ICT. Training of the teachers has been identified as an element that will improve acceptability of ICT in Saudi schools.

The Technology Acceptance Model also shows that motivational factors are identified as appropriate in enhancing compliance and influencing ICT implementation and perceived ease of use and usefulness. The study has demonstrated that Saudi teachers are not motivated in the initial process of implementation and this should be built into the process to ensure acceptability and use of ICT in learning.

The Theory of Planned Behaviour (TPB) looks at the complexity of psychological processes involved in human behaviour and how perceived behaviour is controlled. This model assumes that stronger intention or motivation and individual perceived control of behaviour influences the likelihood of the action. In this study the results showed that most teachers lack the

confidence, as well as the ability, to carry out some of the ICT-related activities. This lack of control of behaviour is influencing ICT utilization. This theory is clearly significant as teachers' are perceived to lack control in terms of policy, training, resources as well as confidence. Similarly with head teachers, although in leadership, there was also perceived lack of control of resources, around policies and the technical support needed for the ICT implementation is schools. Some schools had limited resources with a large number of students. It was not, therefore, due to the internal factors alone but also external factors.

There are, therefore, vital aspects in various models when blended; the TAM, TPB, as well as TRA; that contribute significantly to ICT implementation in the Saudi school context and this study in particular by creating a stable environment that is relevant to behaviour, beliefs, and attitudes as well as individual and environmental factors.

This study confirms that there are barriers within and outside the schools and they can improve by reducing the current complexity and challenges experienced at school and Ministry of Education level to ensure relevant and significant conditions that can enhance attitudes, ownership, confidence and removal of barriers identified in the study that currently limit ICT implementation.

Using the theories and strategies across various research studies and literature has helped this research to develop a study conceptual framework (See table 2.5). This was summed up as factors at school level (internal factors) and those at government level (internal factors). Hence, the study was able to fill the gap in this objective by determining the main factors that make the implementation of ICT in education more successful, which will be explained in detail in the discussion of the fourth objective in this chapter.

8.1.3. Discussion the study third objective: To examine the current ICT implementation in Saudi secondary schools, guided by criteria defined in the study conceptual framework.

This objective is directly connected with what has been achieved in chapter 7, which examined the current ICT situation in Saudi secondary schools. The results from the case study in chapter 5 and 6 showed high consensus among the factors that hinder ICT implementation, which have been monitored in Saudi secondary schools, and the factors that have been developed in the study conceptual framework, which were built based on the findings from the literature review (See table 2.5). This in turn has supported the study's internal validity. According to Trochim (1989, P.), *"[Comparing] an empirically based pattern – that is, one based on the findings*

from your case study—with a predicated one made before you collected your data (or with several alternative predications)... If the empirical and predicated patterns appear to be similar, the result can help the case study to strengthen its internal validity" (cited in Yen, 2014, p. 143).

In general, the results in chapter 7 identified several factors that affect ICT implementation in Saudi secondary schools. Hence, the study was able to achieve this objective successfully. The following section (objective 4) shows all of these factors gathered from the qualitative and quantitative data.

8.1.4 Discussion the study fourth objective: To identify the factors that might facilitate or hinder the application of ICT tools in general and in Saudi secondary schools in particular

The study monitored 36 external and internal challenges that affect ICT implementation in Saudi secondary schools (see table 8.1 below) and most of these factors had a high level of agreement between the study's participants (See level of agreement in table 7.2) and were in line with the relevant literature.

Table 8.1: Factor affecting ICT implementation in Saudi secondary schools

1	Lack of time available to use ICT	**19**	**Lack of clarity in education policy**
2	Lack of confidence in the ability to use ICT	**20**	Growing number of students
3	Lack of headmasters supervision and assessment	**21**	Students' negative behaviours and attitudes
4	Lack of teachers' collaboration	**22**	Lack of appropriate space to use ICT
5	Lack of teacher awareness	**23**	Maldistribution of ICT tools between schools
6	Scheduling problems	**24**	Favouritism
7	Teachers' resistance to change	**25**	Lack of ICT subject
8	Misuse	**26**	Lack of quality of ICT programmes
9	Negative views in ICT	**27**	Lack of maintenance and technical support
10	Lack of appropriate storage space to keep ICT tools	**28**	Lack of appropriate physical learning environment
11	Lack of ICT skills	**29**	Lack of providing ICT training
12	Dissatisfaction about the current ICT situation	**30**	Lack of headmasters' support and collaboration
13	lack of self-motivation	**31**	**Lack of financial resources**
14	Climate impact	**32**	Lack of pedagogy training
15	Impact of religion and culture	**33**	Lack of providing ICT resources (tools)
16	Lack of ICT Infrastructure	**34**	Lack of Ministry of Education supervision
17	Lack of time for training	**35**	Lack of Ministry of Education support
18	Lack of Internet access		

Although the ICT challenges have been identified earlier, in section 2.6, as internal and external challenges. However, this classification could be useful when studying each factor

individually. In the case of this study, it is difficult to address the specific factors without taking into account the related issues, as many internal factors have been caused by the influence of some external factors, and vice versa. For example, lack of ICT training (which is classified as the role of the government; an 'external factor') is linked to the weakness of teachers' ICT skills, which leads to poor application of ICT. Another example: one of the headmasters' roles is to cooperate with the Ministry of Education with regards to ICT. The shortfall in performance of this duty weakens the Ministry's efforts.

It has been mentioned earlier, in chapter 1, that the Saudi government has invested hugely in the ICT sector. However, in spite of this increased spending and governmental support, the progression in the ICT sector, has often been disappointing. There is still a clear gap between the availability of ICT tools in Saudi schools, and strategies/methods of implementation. The Saudi government needs to develop an effective strategy for ICT in education and to implement it into practice. Consequently, there is no meaning in just investing huge amounts of money to equip schools with ICT tools unless they are used effectively.

The successful implementation of ICT, therefore, requires identification of specific problems and factors that affect ICT implementation. The value of ICT tools is enhanced considerably when they are combined with school objectives and visions. Therefore, how to support the implementation of ICT in Saudi secondary schools, what barriers hinder its successful implementation, what are the best methods to make the ICT application more effective and what kind of support that ICT stakeholders need remain serious duties for the Saudi Ministry of Education and educators.

To sum up, all of the factors that have been monitored in this study must be addressed in an integrated manner. Treatment of some factors while leaving others as they are will inevitably lead to failure in ICT implementation.

8.1.5 Discussion the study fifth Objective: To propose a strategic framework for ICT implementation in Saudi secondary schools and draw recommendations

The achievement of the first four objectives has enabled the study to; firstly, examine theories, policies and strategies used to implement ICT in education in order to identify different criteria for ICT implementation in education (See Objective 2 and table 2.6).

Secondly, to examine the current ICT implementation in Saudi secondary schools, in order to identify the factors that might facilitate or hinder the application of ICT tools in Saudi secondary schools, from different stakeholders' perspectives. This has led to a comprehensive

understanding of the challenges that face the successful implementation of ICT in Saudi secondary schools (See Objective 3).

Consequently, the aim of this section is to develop a strategic approach, which is presented in light of the study's participants' proposed solutions and also supported by relevant literature to promote the success of ICT implementation in Saudi secondary schools.

As mentioned earlier, the study found several factors inhibiting ICT implementation in Saudi secondary schools. These factors were classified into seven categories. Hence, findings relevant solutions and recommendations will be illustrated in seven tables. (Based on the seven criteria of the study framework, as shown in chapter 2 table 2.5).

1- ICT Policies and strategy

According to most of the headmasters and teachers that took part in the study, there are many issues related to ICT policy and strategy which have undermined the effective use of ICT. The study found five relevant factors: lack of clarity in education policy, lack of government support, lack of supervision, lack of maintenance and technical support and lack of ICT training. All these factors have led to a state of dissatisfaction.

Regarding the ***lack of clarity in education policy***, the participants suggested providing proper guidelines and policies, which can act as a key foundation to ensure that each department and ICT stakeholder individually knows their role and responsibility. Further to this, the follow-up and supervision can be easily monitored as there would be a clear set of information to go by when assessing progress, so that further improvements can be made.

According to Honey et al. (2005), ICT is less effective when the educational purposes are unclear. They believe that there is *"a clear and meaningful connection between technology and larger educational goals"* (p. 13).

Lack of Ministry of Education support has also been mentioned by most of the headmasters and teachers. They claim there is nobody to listen to their demands in regard to ICT issues. The problem is, as they explained, communication is very poor because the role of the Ministry of Education is centralized and access to officials is not easy.

They suggested a direct line of communication, such as a hotline or email address to explain their demands to the officials. In addition, the lack of government support also undermines the headmasters' ability to reward teachers. They suggested the introduction of regulations that address the ICT budget and the ICT users, which would provide them with the wherewithal to

provide adequate ICT user rewards. Otherwise, given the current situation of ICT in Saudi secondary schools, teachers will continue their disregard for ICT use.

Lack of supervision was also stated as a barrier. Teachers stated that they need help in some issues related to ICT implementation. The headmasters and teachers suggested there is a need for a system of monitoring and supervising the role of technology implementation and its improvements within the school systems. This is to be demonstrated through proper guidance and strategic plans (Culp et al. 2005).

In the current situation, this will not happen as, based on the results, the number of supervisors is very small (One supervisor to 300 schools). The Ministry of Education should raise the number of ICT supervisors and improve supervision procedures as well.

Lack of maintenance and technical support has a further role in the ministry of education. The failure of the Ministry of Education to provide proper maintenance and technical support was obvious from most of the study's participants' observations on broken devices.

Many solutions for this issue have been suggested by participants. Firstly, the Ministry of Education should be contracting specialized ICT maintenance companies and providing spare parts. In addition, they should raise the number of technical workers and workshops. Finally, they should train teachers and headmasters in ICT maintenance.

Lack of providing ICT training was a major barrier facing ICT implementation. In this matter, the study found many issues leading to the lack of training. Firstly, the Ministry of Education policy did not address the limitations of ICT training programs. Teachers, as a consequence, suffered from a small number of available training programs and, where these were provided, they did not always maintain high standards.

The quality of programs lacked the ability to fulfil the needs of the teachers and, thus, they were not always improving the teachers' skills and knowledge. Furthermore, when training sessions were provided the teachers were expected to attend in their own time. This was often considered as a barrier and prevented them from attending. Finally, teachers need incentives to encourage them to attend.

All these issues can be solved if the Ministry of Education pays attention to the importance of ICT training. This can be achieved by increasing the number of ICT training sessions and programs and by improving the quality of the session content. Participants suggested that the sessions should be led by an ICT specialist.

In order to ensure that teachers can attend all training programs, contributors suggested that timetables of all training classes should be listed annually and sent to the school staff at the beginning of the new academic year. A further solution given by most of the headmasters and teachers was the need for encouragement for teachers to attend training programs. This can be done by rewarding attendance. This can be linked again to the lack of an ICT policy as there are a lack of rewards and incentives for those attending ICT training. Table (8.2) gives some solutions as suggested by the study participants and relevant literature.

Table 8.2: The study proposed approach and solutions associated with ICT policy

Criteria	Problem	Why?	Solutions	Targeted
ICT policy & Strategy	1- lack of clarity in ICT policy	❖ No available ICT policy resources ❖ No allocation of responsibilities in ICT ❖ Multiplicity of Ministers of education in a short time	❖ Spread education regulations in books and leaflets to all schools. ❖ Development of long and short-term policy not affected by the change of administrators	School staff and Policy-makers
	2- lack of support	❖ The system of centralization of the Ministry of Education ❖ No budget for rewards	❖ Open channel of communication through direct hotline and emails. ❖ Introduction of regulations that address rewards	School staff
	3- lack of supervision	❖ Short number of supervisors	❖ Increase the number of supervisors	Supervisors
	4- lack of maintenance and technical support	❖ Only One and small work shop for maintenance ❖ Only 4 technical support for more than 2000 schools	❖ Increase the number of workshops and technical workers ❖ Teacher training for maintenance work ❖ contracting with specialized companies in ICT maintenance ❖ Easy to use guides and manual made available ❖ Clearly labelled and stored ICT equipment ❖ Incident reports of damages to equipment to be reported to teacher	ICT department & School staff
	5- lack of ICT training	❖ Few ICT training programs ❖ No incentives ❖ Time problems ❖ Quality of ICT programmes	❖ Employ trained specialists ❖ Increase training programs ❖ Allocation to attend ❖ Facilitate the attendance times ❖ Exchange of experiences between Public and private schools in ICT.	School staff and supervisors

2- ICT as a subject

Concerning ICT as a subject, there is a need to update and modernize its contents. The study found a high level of agreement that the ICT contents are very weak. The Ministry of Education should work to develop the ICT subject to be compatible with modern ICT applications. Involvement of teachers and students in this development is important as stated by most teachers. See table 8.3.

Table 8.3: The study proposed approach and solutions associated with ICT subject

Criteria	Problem	Why?	Solutions	Targeted
ICT subject	❖ Weakness in the ICT contents ❖ Students have no previous knowledge of ICT ❖ Lack of incentives to students to do well ❖ Lack of ICT outcome	❖ Not compatible with modern applications ❖ Not involve teachers and students in the development processes ❖ Not keep up with labor-market needs ❖ Students have been taught very little about ICT in their younger years. ❖ Students feel no need to learn and apply ICT knowledge as its not enforced by their syllabus ❖ Students do not have any reason to do well. There is no reward or incentive in place.	❖ Update ICT content by experts with the involvement of teachers and students in the development processes ❖ Make ICT compulsory in the curriculum from Primary education ❖ Annual or national exams to include ICT components ❖ Government led incentives for high achievers of ICT	Curriculum Department

3- ICT Resources

ICT resources can be classified into three groups, ICT material, human resources (qualified teachers) and financial resources.

Regarding the ICT material, it was evident from the results that there was a shortage in the number of ICT tools in schools. This was for four reasons: maldistribution, favouritism, having no ICT database and the lack of credibility of some of the schools about their real need for ICT tools. Most of the headmasters were claiming a lack of justice in the distribution of ICT tools between schools. Teachers and headmasters stated that the Ministry of Education must fight favouritism and put an end to bypassing of officials. On the other hand, the Ministry of Education needs real information about the schools' needs in regard to ICT tools. A database would solve this issue. There will be no maldistribution of ICT tools and the Ministry will know what the real needs of schools are. Regarding favouritism, the Ministry should change the strategy of distribution of ICT tools, with more supervision in place and monitoring.

Another problem is the language barrier, since most ICT tools are in the English language (Alresheed et.al 2015. Many studies in Saudi Arabia, for example, (Almalki and Williams, 2012, Alresheed et.al 2015) stressed that teachers and students are suffering when using programs that are in English. The study participants suggested that the Saudi government should translate all programs, online and offline software resources as well as the instructions booklet that are included with Arabic setups.

Regarding human resources (qualified teachers), most headmasters and ICT directors emphasized the importance of preparing teachers from the first threshold in the hierarchy of teaching, especially ICT training and pedagogy training. Looking at the results for teachers' ICT skills, it can be seen that there is a shortfall in this area.

In this study, no effect of the nationality of teachers on ICT implementation, as all teachers, in Jeddah public schools, are 100% Saudi nationals. However, private schools may have foreign teachers could produce a different set of results, this is mainly because private schools will hire teachers who are already marked up to a certain standard of ICT knowledge.

Their previous education, degrees and experience are likely to make them confident and able to incorporate ICT in their lessons. The framework suggests a certain element of harmonization between private and public schools could be a positive step forward. Interaction and compromise of staff that is foreign and national staff can allow open discussions on different teaching experiences and result in the exchange of methods and techniques to deal with barriers in ICT usage in secondary schools.

Discussion about bringing changes in to the teaching profession and what influences teachers to change their practice is an important aspect of this study. Suggestions on how to cope with and train older teachers that are more resistant to change are an essential part of the recommendations given in the policy framework.

Teachers are individuals and bring their own elements and approaches to change. Firstly recognizing the barriers as has been done in this study that delay or prevent change such as: the teachers failing to appreciate the need to change, habits, fear of threats to their old ways and language barriers must be identified and then additional support must be given to older teachers. Attitudes of older teachers may be changed with proper training delivered. Those resistant to change can become confident in using new methods if they are able to understand and make use of the Internet and ICT for teaching purposes.

Financial resources are another issue in ICT implementation. The collected data showed the real need for financial resources among schools to solve many problems regarding ICT, such as maintenance and spare parts. The Ministry of Education should allocate a sufficient budget for schools to face such problems. Table (8.4) illustrates problems and suggested solutions.

Table 8.4: The study proposed approach and solutions associated with ICT resources

Criteria	Problem	Why?	Solutions	Targeted
ICT tools	Insufficient ICT tools Language issues	❖ Maldistribution ❖ Favoritism's role ❖ No ICT database ❖ lack of school' credibility ❖ Most ICT device in English language	❖ Ministry of Education should develop an ICT database. ❖ More supervision and monitoring should be in place. ❖ Schools should cooperate in the disclosure about the real needs of ICT tools this could be done by anonymous questionnaires or feedback reports ❖ Translate all online and offline software resources and instructions booklet into Arabic Language	ICT Department and Headmasters
Human resources	Unqualified teachers	❖ Lack in teachers' preparation ❖ Lack of teachers' interest ❖ Lack of teachers' awareness ❖ Resistance to change (especially the old teachers)	❖ Training ❖ Pedagogy training ❖ Reconsider the strategies of acceptance of new teachers ❖ Refresher courses for existing teachers ❖ Chang their attitude by Pedagogy training delivered	Teachers
Financial resources	Lack of financial resources	❖ No clear budget for schools	❖ Support schools and ICT department with sufficient financial resources ❖ Public display of funding and its reports	Schools and ICT Department

4- Learning environment

The last role of the government was providing a proper learning environment. That includes good ICT infrastructure, spaces, storages, as well as a healthy environment which includes safety means, ventilation and air conditioners. The research results, in relation to the school buildings, found that the most buildings are unsuitable for learning and at times are not fit for the purpose of storing and managing or maintaining ICT equipment. The students and teachers interviewed often mentioned lack of space and unfit storage systems for the ICT equipment. In addition, there is a growing number of students in the classrooms. This frequently led to damaged and neglected equipment. To help overcome such issues table 8.5 sets out suggested solutions for safeguarding equipment by including space, climate and a welcoming environment to learn.

Table 8.5: The study proposed approach and solutions associated with the learning environment

Criteria	Problem	Why?	Solutions	Targeted
The learning environment	❖ Lack of spaces ❖ Lack of safety ❖ Growing number of students ❖ Lack of ICT infrastructure ❖ Climate (Humidity and heat	❖ Old buildings ❖ Lack of maintenance ❖ Lack of planning ❖ Shortage of new schools buildings ❖ Lack of government support	❖ New schools should keep pace with the developments in the technology sector ❖ The rehabilitation and reconstruction of old schools ❖ Acceptance of students should be in line with the capacity of schools ❖ Students can visit computer labs in groups or batches for short term solution ❖ The Ministry should provide safety means and clarify them for school staff as well as train them to emergency exits ❖ Labs set in optimum temperatures to prevent damage to equipment	Ministry of Education Headmaster Schools buildings

5- School Culture (Views and attitudes)

The study generally found there are positive views in relation to ICT use and implementation. However, some key factors remain that hinder the incorporation of ICT into the classroom. These factors can be categorized into three main sections. Firstly, the educators who have a negative view of the use of ICT, as some headmasters and teachers feared secondary students to be vulnerable and at a critical age.

This results in teachers having certain issues with allowing the use of the Internet and technology in the system. Although the Saudi outlook is shifting with time there is still a lack of understanding of the exact benefits and advantages of using ICT that result in a resistance to change often due to culture and beliefs.

Secondly, some school staff revealed that the advantages of ICT implementation were not clear and they did not understand how using ICT could benefit the school learners. Some staff found ICT to be a waste of time and money.

Thirdly, there was a lack of confidence in teaching the subject due to poor pre-service training given to teachers that ultimately leads to lack of motivation, which explains the factor of dissatisfaction of teachers and students.
The proper solution found from the results is that the Ministry of Education must raise awareness of the benefits and advantages for educators and learners.

This could be achieved by pedagogical training, sending out circulars, leaflets and pamphlets and monthly meetings with teachers, headmasters and the supervisor for advice and updates.

Table 8.6: The study proposed approach and solutions associated with school culture

Criteria	Problem	Why?	Solutions	Targeted
Views and attitudes	❖ Negative's views and attitudes	❖ Misconceptions ❖ Dissatisfaction ❖ No clear policy	❖ Pedagogy training ❖ Circulars and leaflets ❖ Monthly meetings for advice ❖ Policies should fit with strengthening the Islamic Ideology ❖ Central proxy servers used to block any sites that pose danger	School staff
Religious and Culture	❖ Banning the internet from religion perspective	❖ A religious, culture perspective		
Negative students' Behaviour	❖ Breaking down the ICT tools ❖ Using the internet for non-educational purpose	❖ Lack of headmaster and teacher control ❖ Lack of parent collaboration ❖ Lack of educate students	❖ Penalties for damaged equipment ❖ Responsibility to lie with parents if equipment is damaged ❖ Camera for enforcement ❖ Increase the communication with home ❖ Rise students' awareness	School staff Students And parents

6- Headmasters Role and Responsibilities

The study found one of the factors that hinder the implementation of ICT in the classroom is the lack of collaboration and support from headmasters.

This factor can also be split into two main points: firstly, the support and partnership between the headmaster and teacher and the headmaster with government. Secondly, the results found that there is a lack of supervision and assessment of teachers.

Table 8.7: The study proposed approach and solutions associated with headmaster's role in ICT

Criteria	Problem	Why?	Solutions	Targeted
Creating an attractive learning environment	❖ Lack of; collaboration, support and encouragement	❖ Financial problem ❖ Lack of Ministry of Education support ❖ Lack of teachers collaboration	❖ Pedagogy Training ❖ The Ministry of Education should provide school clear policy identifies headmaster role and responsibilities	Headmaster Ministry of Education
Controlling and assessing ICT use	❖ Lack of assessment and supervision ❖ Lack of Ministry of Education support	❖ Lack of understanding of ICT policy	❖ More authority to assess and supervise teachers ❖ Government should support by supervision and rewards ❖ Setting agendas every week including all faculty members to assess ICT implementation. ❖ Active involvement by headmaster with Ministry of Education to show evidence of ICT usage ❖ Meeting regularly with other headmasters of the region to share ideas and discuss plans	
Provide all ICT facilities	❖ Building problems ❖ Lack of maintenance ❖ Lack of ICT resources	❖ school building (Inappropriate) ❖ Lack of Ministry of Education support ❖ Financial problem	❖ The Ministry of Education should help headmasters in provide and support all ICT facilities	

7- Teachers Roles and Responsibilities

According to the literature review and findings teachers must be confident and able to teach with a positive mind-set. This would suggest that strategically there needs to be a focus and special attention given to promoting a technology-based curriculum and technology practice together in the pre-service teacher education curriculum (Smolin and Lawless, 2007). Only with a certain level of ICT knowledge, teachers can be able to use and implement this within their class. Current or existing teachers must reach a certain level of ICT skills through refresher courses and mandatory work-based training.

Results identified teachers feeling insecure in using ICT tools and at being unsure of applying technology to their teaching methods. The strategy and reason behind such solutions as given in the table is that clear guidelines will highlight that teachers are unable to teach new

technology even if it is placed into the curriculum when they themselves are not comfortable and able to use it and apply it. Teaching methods and instruction methods (Peeraer and Van Petegem, 2011) are out of date and this consequently leaves teachers feeling threatened or unsure about using and teaching ICT.

Table 8.8: The study proposed approach and solutions associated with teachers' role in ICT

Criteria	Problem	Why?	Solutions	Targeted
Activating use of ICT in classrooms	❖ Low level of ICT use at classrooms ❖ Lack in ICT skills	❖ Lack in teachers experience, skills and confidence ❖ Resistance to Change ❖ Lack of incentives ❖ Lack of time to use because the workloads ❖ Lack of headmaster support and supervision ❖ Lack of ICT tools ❖ Lack of ICT infrastructure	❖ The Ministry should raise awareness of new teachers about the ICT benefits and advantages ❖ ICT Training ❖ Pedagogy training ❖ Headmaster should play role in supervision, assessment and encouragement (incentives) as well as reduce the workloads for teachers. ❖ Providing sufficient number of ICT tools ❖ Course material made available online ❖ Career progression based on ICT skills development	Teachers

8.2. SUMMARY AND MAIN FINDINGS

From the findings of the study it can be concluded

- The history of ICT has encompassed four revolutions.
- ICT is an evolving term, therefore there is no agreement on one clear definition.
- Most of the developed countries in their ICT policies focus on the development of infrastructure, training, and cooperation with various parties, and develop clear educational policies translated into action.
- The Saudi government needs clearer direction as to where to place the funding in education and how to monitor it.
- There are clear gaps within the partnerships between the government officials and the headmasters, as well as between the educators and the learners, in regard to the responsibilities in ICT implementation.
- There are obvious weaknesses in the Saudi teachers' skills in technical areas due to their lack of training.
- Negative views and attitudes towards the integration of ICT in education are due to a lack of pedagogical training.

- Deficiencies in the roles of headmasters and teachers in ICT are a significant reason for the weakness of ICT application.
- Ambiguity in the Ministry of Education policy has led to a lack of clarity in roles, responsibilities and goals.
- Several problems need to be addressed in the Saudi school environment, such as infrastructure, means of safety, the overcrowding of students in classrooms, all of which are the causes of the impaired use of technology.
- There is an urgent need to develop ICT as a subject to keep pace with advances in technology and the requirements of the labour market.
- The strategies currently used in the preparation and the acceptance of ICT by new teachers need to be reviewed.
- Shortcomings in the role of the Ministry of Education (supervision, technical support, financial support, adequate ICT tools and quality) have led to the aggravation of the problems.

In summary, the study formulates a strategic approach to incorporating ICT within Saudi secondary schools and offers solutions to deal with the factors found to be inhibiting its implementation. The importance and uniqueness of this study is that only after understanding and assessing different views and perspectives can a strategic approach be developed that is easy to implement within the current system, in order to see rapid and extensive. The suggested strategy approach for this study is illustrated in the table below.

Table 8.9: Strategic approach for successful implementation of ICT in Saudi secondary schools

Criteria	Problem	Why?	Solutions	Targeted
1- ICT policy & Strategy	1- lack of clarity in ICT policy	❖ No available ICT policy resources ❖ No allocation of responsibilities in ICT ❖ Multiplicity of Ministers of education in a short time	❖ Spread education regulations in books and leaflets to all schools. ❖ Development of long and short-term policy not affected by the change of administrators	School staff and Policy-makers
	2- lack of support	❖ The system of centralization of the Ministry of Education ❖ No budget for rewards	❖ Open channel of communication through direct hotline and emails. ❖ Introduction of regulations that address rewards	School staff
	3- lack of supervision	❖ Short number of supervisors	❖ Increase the number of supervisors	Supervisors
	4- lack of maintenance and technical support	❖ Only One and small work shop for maintenance ❖ Only 4 technical support for more than 2000 schools	❖ Increase the number of workshops and technical workers ❖ Teacher training for maintenance works ❖ contracting with specialized companies in ICT maintenance ❖ Easy to use guides and manual made available ❖ Incident reports of damages to equipment to be reported to teacher	ICT department & School staff
	5- lack of ICT training	❖ Few ICT training programs ❖ No incentives ❖ Time problems ❖ Quality of ICT programmes	❖ Employ trained specialists ❖ Increase training programs ❖ Allocation to attend ❖ Facilitate the attendance times ❖ Exchange of experiences between public and private schools in ICT.	School staff and supervisors
2- ICT subject	❖ Weakness in the ICT contents	❖ Not compatible with modern applications ❖ Not involve teachers and students in the development processes ❖ Not keep up with labor-market needs ❖ Students have been taught very little about ICT in their younger years.	❖ Update ICT content by experts with the involvement of teachers and students in the development processes ❖ Make ICT compulsory in the curriculum from Primary education ❖ Annual or national exams to include ICT components ❖ Government led incentives for high achievers of ICT	Curriculum Department
3- ICT tools	Insufficient ICT tools English Language	❖ Maldistribution ❖ Favoritism's role ❖ Lack of ICT database ❖ lack of school' credibility ❖ Most ICT online and offline software resources are in English language	❖ Ministry of Education should develop an ICT database. ❖ More supervision and monitoring should be in place. ❖ Schools should cooperate in the disclosure about the real needs of ICT tools this could be done by anonymous questionnaires or feedback reports ❖ Translate all online and offline software resources and instructions booklet into Arabic Language	ICT Department and Headmasters
4- Human resources	Unqualified teachers	❖ Lack in teachers' preparation ❖ Lack of teachers' interest ❖ Lack of teachers' awareness	❖ Training ❖ Pedagogy training ❖ Reconsider the strategies of acceptance of new teachers ❖ Refresher courses for existing teachers	Teachers
5- Financial resources	Lack of financial resources	❖ No clear budget for schools	❖ Support schools and ICT department with sufficient financial resources ❖ Public display of funding and its reports	Schools and ICT Department
6- The	❖ Lack of spaces ❖ Lack of safety	❖ Old buildings ❖ Lack of maintenance	❖ New schools should keep pace with the developments in the technology sector ❖ The rehabilitation and reconstruction of old schools	Ministry of Education

learning environment	❖ Growing number of students ❖ Lack of ICT infrastructure ❖ Climate	❖ Lack of planning ❖ Shortage of new schools buildings ❖ Lack of government support	❖ Acceptance of students should be in line with the capacity of schools ❖ Students can visit computer labs in groups or batches for short term solution ❖ The Ministry should provide safety means and clarify them for school staff as well as train them to emergency exits ❖ Labs set in optimum temperatures to prevent damage to equipment	Headmaster Schools buildings
7- Views and attitudes	❖ Negative's views and attitudes	❖ Misconceptions Dissatisfaction ❖ No clear policy	❖ Pedagogy training ❖ Circulars and leaflets ❖ Monthly meetings for advice ❖ Policies should fit with strengthening the Islamic Ideology ❖ Central proxy servers used to block any sites that pose danger	School staff
8- Religious and Culture	❖ Banning the internet from religion perspective	❖ A religious, culture perspective		
9- Negative students' behaviour	❖ Breaking down the ICT tools ❖ Using the internet for non-educational purpose	❖ Lack of headmaster and teacher control ❖ Lack of parent collaboration ❖ Lack of educate students	❖ Penalties for damaged equipment ❖ Responsibility to lie with parents if equipment is damaged ❖ Camera for enforcement ❖ Increase the communication with home ❖ Rise students' awareness	School staff Students And parents
10- Creating an attractive learning environment	❖ Lack of; collaboration, support and encouragement	❖ Financial problem ❖ Lack of Ministry of Education support ❖ Lack of teachers collaboration	❖ Pedagogy Training ❖ The Ministry of Education should provide school clear policy identifies headmaster role and responsibilities	Headmaster
11- Controlling and assessing ICT use	❖ Lack of assessment and supervision ❖ Lack of Ministry of Education support	❖ Lack of understanding of ICT policy	❖ More authority to assess and supervise teachers ❖ Government should support by supervision and rewards ❖ Setting agendas every week including all faculty members to assess ICT implementation. ❖ Active involvement by headmaster with Ministry of Education to show evidence of ICT usage ❖ Meeting regularly with other headmasters of the region to share ideas and discuss plans	
12- Provide all ICT facilities	❖ Building problems ❖ Lack of maintenance ❖ Lack of ICT resources	❖ school building (Inappropriate) ❖ Lack of Ministry of Education support ❖ Financial problem	❖ The Ministry of Education should help headmasters in provide and support all ICT facilities	
13- Activating use of ICT in classrooms	❖ Low level of ICT use at classrooms ❖ Lack in ICT skills	❖ Lack in teachers experience, skills and confidence ❖ Resistance to Change ❖ Lack of incentives ❖ Lack of time to use because the workloads ❖ Lack of headmaster support and supervision ❖ Lack of ICT tools ❖ Lack of ICT infrastructure	❖ The Ministry should raise awareness of new teachers about the ICT benefits and advantages ❖ ICT Training ❖ Pedagogy training ❖ Headmaster should play role in supervision, assessment and encouragement (incentives) as well as reduce the workloads for teachers. ❖ Providing sufficient number of ICT tools ❖ Course material made available online ❖ Career progression based on ICT skills development	Teachers

8.3. CONCLUSION

This study has successfully achieved its aim of developing a strategic approach towards the implementation of ICT in Saudi secondary schools. The identification of criteria of successful ICT implementation has enabled the research to build a strategic by which the implementation of the current ICT in Saudi secondary schools can be assessed in light of the ICT stakeholders' (ICT director of ICT, headmasters, teachers and students) perspectives. Examining the current ICT implementation in Saudi secondary schools has revealed that ICT in the country faces many challenges in seven areas. These challenges, in most respects, ensued from the gap between the views of headmasters and teachers and this can lead to serious issues when incorporating ICT into the learning. Headmasters seem to have a way to report problems but will see them in other forms and teachers have plenty of complaints but little tactics or approaches to connect with government officials. Subsequently, issues from teachers are mostly ignored. The lack of help available and the limited responses given to teachers' means they are less likely to come forward and be honest about what they require.

Teachers can also be partially blamed for the ineffective use of ICT as certain models and literature have shown that teachers are resistant to changes in their methods of teaching. This can be confirmed in chapter 5 where students can often feel trapped in between the teachers and headmasters since collaboration is so poor. Teachers can be seen to be portraying false images so that it may seem that ICT is effectively being used, however this is clearly not the case.

In Saudi Secondary schools, the implementation of ICT has been rather surprising, particularly evident when understanding the points of view of teachers. The issues of ICT implementation has been looked into by various ICT strategies and policies, as identified in the literature and the discussion and summarized in table (2.3) and within these experiences, the struggle to find the hindrances has been attempted through this study.

The funding of resources may well occur in certain areas, however, the development of training courses being inadequate, as discussed in chapter 5 and 6, is central to the failure of ICT implementation. Without a doubt, weak collaboration and communication between teachers, headmasters and government is what must be first resolved. This consequently leads students to feel neglected and trapped. This is not to say that students themselves will not play a part in the ICT implementation as there are some common characteristics found in the data coming from students that showed they enjoyed and embraced ICT.

As seen in chapter one, there is a key conceptual space when discussing the acceptance of ICT and how this can be contested. Further discussed in chapter 2 and 3 as well as illustrated in the

results in chapters 5 and 6, there are numerous differences in leadership roles and responsibilities. This study furthers the discussion on who is responsible and what each role is perceived as. It is significant to mention here how each role is key in the successful implementation of ICT and how a good clear understanding of each other's role can avoid conflicts and blame.

Education is the key process to end poverty and increase global outreach. ICT use can increase connectivity between students and teachers, increase online learning and produce classrooms that are more efficient. In order to allow decent ICT usage and incorporation in secondary education the factors above must be individually resolved and then a constant supply of motivation and training is needed. All elements linked together can produce a challenge-free education environment.

8.4. STRENGTH AND LIMITATIONS OF THIS STUDY

Although the study was able to achieve its aim and objectives, the study's strengths and limitations should be stated in order to present a clear picture of the work that has been achieved.

The major strength of this research is that it is local primary research that offers outcomes regarding students, teachers and headmasters and some Education Ministry supervisors concerning ICT application in Saudi secondary schools in Jeddah city. This study, therefore, offers their opinions on their roles and their stances on ICT in Saudi secondary schools. The research recognized aspects that sustain and obstruct ICT application in learning.

This data will notify decision-makers in Saudi Arabia of the present circumstances and opinions of pupils, teachers and headmasters. It has multiple consequences for the expert advancement of teachers and headmasters and discloses numerous control aspects that require assertion to motivate teachers and headmasters to employ ICT in schools. More significantly, the research comprised both males and females.

This had numerous consequences for the standard of the research. Primarily, as the researcher knows, few Saudi-founded studies have tackled female and male ICT matters in similar types of research, resulting from challenges encountered by any researcher desiring to access different gender institutions.

This study manages to bridge the research operations gap in Saudi Arabia, is a great achievement and adds to the gender value of this study. Furthermore, the research's strength was its capability to combine different data gathering tools, like questionnaires and interviews

and advanced them for the study to better fit the Saudi setting and thus mirror practical teacher and headmaster ICT utilisation opinions and outlooks.

Additionally, even though the research was reliant on Western founded writings in the summary of associated study and translation of outcomes, it affirmed that comparable sequences of ICT employment, opinions and substantiating and obstructing aspects are present in Saudi institutions, as with other nations though considerable variations exist. This research also proposes a strategic approach that is essential for future ICT development in the country.

There are some limitations as identified: the research was geographically restricted to Saudi schools within Jeddah city and performed by a postgraduate student residing in the UK, who had inadequate time and resources, particularly Arabic resources, contrasted with those a full time researcher residing in Saudi Arabia could have.

This research employed questionnaires and interviews to gather data. If there were sufficient time and resources to broaden the research to rural regions and alternative cities, in-depth data would have been acquired to enhance the current findings and determine if the research outcomes were generalizable over the nation or particular to pupils, teachers and headmasters employed and learning at the schools involved in the research.

Nonetheless, provided the time limitations, extended geography of Saudi Arabia and accessible reserves for the research, it was regarded as crucial to choose only Jeddah City as opposed to extracting a sample from institutions in alternative cities or towns as such planning would require additional travel and increased expenses of time and money, which is not available for such research.

The limitation of words was a big problem, for the researcher, especially in quantitative analysis. For example, the presence of more than one variable, such as age, sex, location and type of school building needs to show the relations between these variables and how they could give significant results. The researcher just gave a summary for the main findings.

Despite the outlined limitation, this has been pioneering research and that adds value to the ICT debate, especially in Saudi Arabia.

8.5. CONTRIBUTION TO KNOWLEDGE

The study's contribution to knowledge is presented in light of its stakeholders and the advantages it could provide to them:

- Given that the study has identified seven key criteria for assessing ICT implementation in education, it helps researchers in the ICT field to consider these criteria when building approaches related to ICT implementation in education.
- The study's ICT framework could provide researchers with valid themes and sub-themes, which they can use in their research approaches and comprehensive research instruments.
- The study's strategic approach has highlighted the importance of involving school staff and the Ministry of Education in the process of issues related to ICT in education. This helps to direct researchers when selecting the study participants for investigating issues concerning ICT.
- The study approach used mixed method design that comprises two data collection techniques, which could help researchers in making decisions regarding the approach they could use to collect data concerning ICT implementation in education.
- Given that the findings of the research provide a comprehensive image of current ICT implementation in Saudi secondary schools, it could help to build the first step for researchers in the field to more comprehensively investigate barriers that face ICT in the area.
- The study's framework could be a guide for researchers in Saudi Arabia to examine the implications of the approach in rectifying the factors that are facing ICT implementation in the country.
- The study framework provides the Saudi Ministry of Education and schools with a comprehensive instrument for the current ICT implementation situation in Saudi secondary schools and could help to find solutions.
- By identifying barriers that face ICT implementation, the study provides the policy-makers with negative factors that must be avoided in future applications.

8.6. RECOMMENDATIONS

The study recommendations are classified into three categories, the first of which addresses recommendations that are pertinent to the researchers in the field, the second of which is directed to the government level and, lastly, the third to the school level.

I. Recommendations for research

- ✓ Given the rapid advancement in the ICT sector, the seven criteria provided and 36 factors that affected ICT implementation in Saudi secondary schools could be improved to encompass the emergence of future changes in the same area, which may lead to the creation of more factors.
- ✓ Researchers in the field of ICT could examine the influence of the 36 factors on the validity and implementation of the study's seven proposed criteria.
- ✓ Researchers could benefit from investigating in depth the participants' satisfaction and needs concerning the ICT criteria proposed by the study
- ✓ Border research that compares the implementation of ICT in more than one city in Saudi Arabia could produce more general results.
- ✓ Given that the study was not able to collect qualitative data through interviews with female schools, some female researchers may push to investigate by using both research tools. This could be beneficial to the body of research, particularly in Saudi Arabia where the separation between genders is unavoidable due to religious and cultural values.
- ✓ Issues such as the role of favoritism in the distribution of ICT tools to schools as well as maldistribution. In addition, the impact of climate on the ICT tools has not yet been explored, which is a highly recommended field for investigating.
- ✓ The study approach in assessing the success factors of ICT implementation in education proved the importance of involving ICT users in assessing the quality of the ICT subject, which should be taken into account by the Ministry of Education in planning for future development.
- ✓ The study highlights areas of recommendations that need to be effected to improve ICT implementation in Saudi Arabia.

At Government level:

- ✓ The Ministry of Education should consider reforming ICT policies and strategies to eliminate challenges to the implementation of ICT in education.
- ✓ The different parties were unclear about their specific roles and responsibilities in ICT implementation, so there is a need to review all areas roles and responsibilities at Ministry of Education and school level and with all stakeholders.
- ✓ Review and structure the ICT curriculum to ensure it is comprehensive and adapted to economic and development needs as well as the progression in line with other successful models.

- ✓ Review and implement training for school staff
- ✓ Review pre–teacher training to include ICT for better integration
- ✓ Provide frequent and supportive supervision and follow-up
- ✓ Review and develop better resource allocation procedures
- ✓ There is need to improve on the ICT learning environment by improving supply of tools and ICT infrastructure across all schools
- ✓ There is need to establish a system to monitor, supervise and provide follow-up in all schools.
- ✓ There is need to improve in collaboration with clear feedback channels across partners.
- ✓ Maldistribution and favoritism should be avoided; equality in schools should ensure that all schools have reasonably similar levels of resources.
- ✓ The country's cultural, religious and social ideals must also be met, which means understanding and implementing policies that fit with strengthening Islamic ideology rather than opposing it.
- ✓ Education policies should promote the use and integration of ICT, and effective policies can be planned only by having understood the teachers', headmasters' and students' overall perspectives regarding ICT, and their views on what is currently being practised.
- ✓ Translate all online/offline software recourses in Arabic and provide instructions booklets in Arabic. Syllabus developers should also be involved.

At school level

- ✓ There needs to be more collaboration and cooperation between all parties.
- ✓ Training for headmasters and teachers as well as administrators in employing ICT in their roles.
- ✓ In implementation there is need to improve teaching techniques - but also to add some form of discipline and describe or explain the importance and explain the ultimate benefits of using ICT and its effects for after school business use.
- ✓ Student interests are key to ultimately accepting and implementing ICT. There is need to motivate the students to avoid vandalizing equipment by involving them in the early stages as well as learning; haring responsibility and offering some form of incentives for the school as a whole.
- ✓ Technical support, maintenance and supervision should be in schools.

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Appendix 1(A)

MEASURES TO PROMOTE THE TRUSTWORTHINESS OF THE INTERVIEWS (Before, During and After)

Applied measures to promote the trustworthiness of the interviews		Procedures
Before the interviews	**Based on recommendations by Hewson et al. (2003) In the recruitment stage,**	In the first stage of conducting interviews process, the researcher obtained a letter of permission from the Ministry of Education to visit schools that had been suggested to participate in the research. Based on the small number of interviewees (n=14, in 4 schools and 2 ICT departments), and after identifying the participating schools from the list of the Department of Education in Jeddah city, a short visit was made to each school, in order to establish that they already used ICT tools. During the visiting, the purpose of the research was explained in advance before sending any formal requests, and the headmasters were asked to select teachers and students to participate. In addition, email addresses and mobile numbers were exchanged in order to confirm interview times. Regarding the ICT directors, they were phoned for their agreement to take part in the study, which was subsequently granted. Recruitment emails were sent to each participant individually to ensure anonymity, informing them of the purpose and length of the interview they would be required to undergo. The information was included within the email itself, rather than as an attachment, in order to avoid suspicion of virus. The participants were asked to respond with their approval, after which they were emailed a consent form to be signed before the interview, which they were asked to read carefully, adding their comments or queries, and selecting a time and place of interview. They were also informed that they would be given further clarification and explanation before the actual interview took place. The interview dates were confirmed by email or phone. In order to encourage those who had not responded to the initial email, follow up emails and calls were made one week later to offer them a further chance to participate, thus the researcher could find out if it was necessary to find others willing to participate.

Appendix 1(B)

Applied measures to promote the trustworthiness of the interviews		Procedures
During the interviews	**Interviewer/interviewee bias and interviewer's credibility**	To ensure the interviews were carried out within a relationship of trust and credibility, which can have a clear impact on the reliability of the data collected, appropriate guidelines were used (Easterby-Smith et al., 2008). Bias, both in the interviewer, and in the interviewee, was avoided by the researcher focusing on well-established themes from the literature (see the study conceptual framework), rather than on his own preconceptions, beliefs and views. In addition, leading questions were avoided, and during the interview the interviewee was not subjected to comments or tone that might lead to a lack of objectivity. Moreover, using the themes from the literature ensured that the researcher was able to both enhance his credibility by demonstrating his own high level of knowledge, and also to prepare the interviewee prior to the interview with the information and topics expected to be raised in the questions, thus heightening the credibility and trustworthiness of the collected data
	Time, place and appearance	The timing and location of interviews are other significant factors which can contribute to the avoidance of bias. According to Robson (2002), if an interview is too long, this may result in the interviewee perceiving it as time wasting, and thus prevent the possibility of additional questions being asked and responded to. In addition, the location may have a detrimental effect, which can indirectly result in bias towards the issues discussed. Hence, it seems essential for the interviewee to have control over these aspects, and this was achieved by the interviewee selecting a suitable interview time and place, as long as this complied with research ethics, from the slots available given in the initial email, as well as offering the option of interviewing over several short interviews rather than one long one. To further develop trust and a positive attitude towards the interview, the interviewer also demonstrated an appropriate appearance and a neutral posture, and developed rapport by expressing interest in the interviewee's role and position.
	Questions	It is also essential that consideration is given to the wording and delivery of questions, in order to ensure the ensuing data is trustworthy and dependable. Following the guidelines suggested by Easterby-Smith et al. (2008), the questions used were short and worded clearly, avoiding jargon, and asked in a neutral tone. In addition, the pace of the questions allowed the interviewees enough time to think carefully before their response. Opinion seeking questions were asked at the beginning of the interview, using probing questions to further ensure clarification of the meaning and reasons behind the answers, with the questions rephrased if the response did not provide sufficient information related to the theme.
	Notes and recording	Following Ghauri and Grønhaug's (2005) suggestions, the researcher summarised in note form each response after it had been given. This not only ensured that he remained focused during the interview, but also offered the possibility for the interviewee to read through the summary after the interview, and thus to review what had been recorded, amending any inaccuracies or misinterpretations, and adding further relevant information, thus enabling the researcher to re-evaluate his interpretation.

Appendix 1(C)

Applied measures to promote the trustworthiness of the interviews		Procedures
After the interviews	**Credibility (internal validity) and dependability (reliability)**	This created an additional opportunity to reduce bias, and to ensure the credibility and trustworthiness of his findings (Guba and Lincoln, 2001). Furthermore, transcribing the interviews as soon as possible in note form, in accordance with the suggestions of Guba and Lincoln (2001) also allowed for the incorporation of contextual information, such as the location, time of interview, and the initial impressions of the researcher of both the interviewee and the information given, which again enhanced dependability in the findings. These responses were analysed using the embedded case study model (Yin, 2003), within which each piece of evidence is analysed in subunits, integrating a wide range of data which was compared and contrasted in order to establish the differences between the secondary schools studied, which is further highlighted in the analysis of the qualitative data (see Chapter V), again, clearly demonstrating the credibility and reliability of the findings.
	Transferability (external validity) and conformability (objectivity)	Finally, conformability and transferability are two further significant issues that it is important to address in order to produce valid and reliable results. To ensure conformability, which relates to the importance of findings being confirmed by others (Guba and Lincoln, 2001), issues related to the methodological process, and possible explanations and understandings of the results of the findings, were explored with three of the researchers' colleagues, which resulted in confirmation of the researcher's interpretations. Finally, the issue of transferability, which indicates the ability of the results of the findings to be transferable or generalizable to other contexts (Guba and Lincoln, 2001).

Appendix 2 (A)
Headmaster Questionnaire

- ***Section A: Personal information***

1- Gender: ☐Male ☐Female

2- Age:

Under 30	30-35	36-40	41-45	46-50	51-55	56-60
☐	☐	☐	☐	☐	☐	☐

3- Indicate with a (√) the number of your experience in educational field:

1-5	6-10	11-15	16-20	21-25	26 and more
☐	☐	☐	☐	☐	☐

4- Academic qualification

Other	Diploma	Bachelor degree	Master degree	PhD degree
☐	☐	☐	☐	☐

5- Indicate with a (√) the level of training courses that you may got of the following courses

	Level of ICT training in	Advanced	Good	Moderate	Poor	No Training
1	Basic Computer skills	☐	☐	☐	☐	☐
2	Microsoft word	☐	☐	☐	☐	☐
3	PowerPoint	☐	☐	☐	☐	☐
4	E-mail	☐	☐	☐	☐	☐
5	Website Design	☐	☐	☐	☐	☐
6	Internet browsing	☐	☐	☐	☐	☐
7	Printing	☐	☐	☐	☐	☐
8	Scanning	☐	☐	☐	☐	☐
9	Interactive Whiteboard	☐	☐	☐	☐	☐
10	Projector/ Data show	☐	☐	☐	☐	☐
11	Computer Maintenance	☐	☐	☐	☐	☐
12	Others…	☐	☐	☐	☐	☐

6- Indicate with a (√) how often you use ICT tools per day in your school

More than 3 hours	2-3 hours per day ay	Less than one hour per day	I don't use it
☐	☐	☐	☐

- ***Section B: Current Availability and Use of ICT tools***

Indicate with a (√) to ICT's Hardware/ Software which [Available/Un available] in your school.
Key: 5= Available with use at all times 4= Available with frequent use 3= Available with limited use 2= Available with no use at all 5= Un-available

	ICT (Hardware/ Software) in your school	Available with use at all times	Available with frequent use	Available with limited use	Available with no use at all	Un-available
1	Computer lap	□	□	□	□	□
2	Access to Computer	□	□	□	□	□
3	Administrators Access to internet	□	□	□	□	□
4	Teachers Access to internet	□	□	□	□	□
5	Students Access to internet	□	□	□	□	□
6	Printer	□	□	□	□	□
7	Scanner	□	□	□	□	□
8	Interactive Whiteboard	□	□	□	□	□
9	Projector/ Data show	□	□	□	□	□
10	Video/ DVD player	□	□	□	□	□
11	TV	□	□	□	□	□
12	PowerPoint	□	□	□	□	□
13	Microsoft Word	□	□	□	□	□
14	School website	□	□	□	□	□
15	Other……					

- ***Section C: Level of ICT's Skills.***

Please indicate with a (√) your level of ICT Skills:
5= Expert 4= Advanced level 3=Intermediate level 2= Beginner level 1= Non-existent

	Level of ICT Skills	Advanced	Good	Moderate	Poor	No Skills
1	General computer skills level	□	□	□	□	□
2	Using the internet for work duties	□	□	□	□	□
3	Using Microsoft word Programme	□	□	□	□	□
4	Using PowerPoint programme	□	□	□	□	□
5	Fixing some computer problems and other ICT devices	□	□	□	□	□
6	Teaching how to use ICT in classrooms	□	□	□	□	□
7	Dealing electronically with the Department of Education / Ministry of Education	□	□	□	□	□
8	Communicate with your staff and students electronically	□	□	□	□	□

- ***Section D: ICT application in headmaster functions***

The following are some application of ICT that you deal with during school day. Please indicate the degree of agreement by indicating (√) on one of the most applicable to you
Key: 1= Never- 2 = Rarely- 3 = Sometimes- 4 = Often- 5 =Always

	ICT application in headmaster functions	Always	Often	Some times	Rarely	Never
1	Browsing the internet	□	□	□	□	□
2	Microsoft Word	□	□	□	□	□
3	PowerPoint application	□	□	□	□	□
4	Using e-mail	□	□	□	□	□
5	Communication with the Ministry of Education	□	□	□	□	□
6	School Timetable	□	□	□	□	□

7	Schemes of work	□	□	□	□	□
8	Students' progress reports	□	□	□	□	□
9	Teachers Assessment	□	□	□	□	□
10	Staff personal information records	□	□	□	□	□
11	Students' admission details	□	□	□	□	□
12	Staff responsibilities records	□	□	□	□	□
13	Communication with staff electronically	□	□	□	□	□
14	Communication with students and parents	□	□	□	□	□
15	Other Functions …..					

- ***Section E: Challenges Facing ICT Implementation***

The following are some challenges that you think face ICT implementation in your school. Please indicate the degree of agreement by indicating (√) on the most applicable to you.
Key: 5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2= Disagree, 1= Strongly Disagree

	Challenges	S.A	Agree	Neutral	Disagree	S.D
1	Lack of Financial resources	□	□	□	□	□
2	Lack of time available to use it	□	□	□	□	□
3	Lack of ICT training's programmes	□	□	□	□	□
4	No or slow Internet access	□	□	□	□	□
5	Lack of suitable infrastructure					
6	Teachers' negative attitude	□	□	□	□	□
7	Lack of time for training	□	□	□	□	□
8	Lack of teacher awareness about the importance of ICT in educational pedagogy	□	□	□	□	□
9	Lack of appropriate space to use it	□	□	□	□	□
10	Lack of storage spaces to keep it	□	□	□	□	□
11	Lack of Teachers' experience in ICT	□	□	□	□	□
12	Scheduling problems	□	□	□	□	□
13	Teachers' resistance to change.	□	□	□	□	□
14	Lack of supervision from the Ministry of Education	□	□	□	□	□
15	Lack of Maintenance	□	□	□	□	□
16	Lack of ICT tools	□	□	□	□	□
17	Lack of incentives and motivation	□	□	□	□	□
18	Growing number of students	□	□	□	□	□
19	students' negative attitude	□	□	□	□	□
20	Lack of technical support	□	□	□	□	□
21	Traditions and beliefs	□	□	□	□	□
22	Lack of understanding of ICT policy	□	□	□	□	□
23	The effect of climate on efficiency and performance of devices	□	□	□	□	□
24	Lack of teachers collaboration	□	□	□	□	□
25	Lack of confidence in the ability to use	□	□	□	□	□
26	Lack of classroom management skills	□	□	□	□	□
27	Important role of favouritism in the unequal distribution of ICT equipment to schools	□	□	□	□	□
28	Lack of headmaster supervision	□	□	□	□	□
	Other comments…….	□	□	□	□	□

- ***Section F: Headmaster perception towards ICT in education.***

We want to get your views about the application of ICT in education. Please indicate the degree of agreement by indicating (√) on the most applicable to you.
Key: 5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2= Disagree, 1= Strongly Disagree

	***Your views about ICT in* education**	S.A	Agree	Neutral	Disagree	S.D
1	ICT has an important part to play in teaching and learning generally.	□	□	□	□	□
2	Using ICT is a dull activity	□	□	□	□	□
3	ICT makes work easier	□	□	□	□	□
4	ICT makes teaching enjoyable, changes routine, and keeps boredom at bay.	□	□	□	□	□
5	ICT improves student results.	□	□	□	□	□
6	Using ICT can save time and effort	□	□	□	□	□
7	ICT increases cooperation between teachers and students	□	□	□	□	□
8	ICT improves teachers & students' research skills	□	□	□	□	□
9	I am very interested in learning about ICT and use it in my job	□	□	□	□	□
10	We need to prepare our schools to use ICT before starting to apply it.	□	□	□	□	□
11	The money spent on the ICT sector is not worth it.	□	□	□	□	□
12	We need to train teachers before the introduction of technology so that it does not lose its importance	□	□	□	□	□
13	We need to change the mind-sets of some students and teachers about the importance of ICT in teaching and learning.	□	□	□	□	□
14	ICT has no effect unless there is the principle of reward and punishment.	□	□	□	□	□
15	Traditional teaching and learning better than teaching using ICT	□	□	□	□	□
16	Using ICT is just a waste of time.	□	□	□	□	□
17	I do not encourage the use of the internet in schools because it is contrary to our traditions and customs.	□	□	□	□	□
18	I forbid the use of the internet because some students tend to use it outside the range of learning.	□	□	□	□	□
19	I think it is a religious duty, the internet should be banned in secondary schools.	□	□	□	□	□
20	I forbid the use of the internet in my school, because high school students are at a critical age.	□	□	□	□	□
21	Other…					

- ***Section G: Headmaster view towards the ICT policy***

We want to get your views and belief about the ICT policy Please indicate with a (√) the degree of agreement to the most applicable to you.
Key: 5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2= Disagree, 1= Strongly Disagree

	Your view and understanding of ICT's policy	S.A	Agree	Neutral	Disagree	S.D
1	The ICT policy is not clear.	□	□	□	□	□
2	The ICT policy has a positive effect on my attitude towards its use.	□	□	□	□	□
3	It's not my business to implement the ICT policy; it's the role of the headmaster.	□	□	□	□	□
4	I pay little attention to ICT in my school due to the lack of clarity in the current policy.	□	□	□	□	□

5	The ICT policy is just theory and has not been applied in practice.	□	□	□	□	□
6	There is a weakness in explaining ICT policy and its goals in education.	□	□	□	□	□
7	I receive encouragement and support from the Ministry of Education when I use ICT in my school	□	□	□	□	□
8	I have no idea about the ICT policy.	□	□	□	□	□
9	The Ministry of Education is keen to raise the awareness of teachers about the importance of ICT.	□	□	□	□	□
10	The Ministry of Education has not developed clear goals and instructions on ICT implementation.	□	□	□	□	□
11	It's the duty of the Ministry of Education to educate teachers in advance about the education policy.	□	□	□	□	□
12	I don't need to know about the ICT policy because nobody is likely to ask me about it.	□	□	□	□	□
13	Frankly, I haven't heard of the Ministry of Education's policy.	□	□	□	□	□
14	Other….					

- ***Section H: Headmaster role towards ICT implementation.***

Please indicate the degree of agreement by indicating (√) on the most applicable to you. Key:
1= Never 2 = Rarely 3 = Sometimes 4 = Often 5 =Always

	Your Roles toward ICT	Always	Often	Some times	Rarely	Never
1	I am keen to provide every ICT resource to be available at my school.	□	□	□	□	□
2	I encourage my teachers to use ICT.	□	□	□	□	□
3	One of my duties in assessing the work of teachers is evaluating how they employ ICT in their lessons.	□	□	□	□	□
4	I aim keen to provide training courses for my teachers.	□	□	□	□	□
5	I'm keen to ensure the maintenance and repair of ICT devices.	□	□	□	□	□
6	I encourage teachers to attend ICT training courses.	□	□	□	□	□
7	I'm keen for all my teachers to use ICT tools in all lessons.	□	□	□	□	□
8	I'm keen to adhere to safety requirements for students and teachers when they use ICT devices	□	□	□	□	□
9	I always explain to my teachers the importance of ICT tools in educational processes.	□	□	□	□	□
10	I'm keen to provide an appropriate place to store ICT devices.	□	□	□	□	□
11	I'm keen to keep the computer lab open to students and teachers at all times.	□	□	□	□	□
12	I try to make the classroom environment more enjoyable by integrating technology in all areas of education	□	□	□	□	□
13	I always ask teachers and students to pay attention to safety issues when using ICT devices.	□	□	□	□	□
14	I ask teachers to involve students in the use of ICT tools in lessons.	□	□	□	□	□
15	I encourage students and teachers to use the internet throughout the whole of the school day.	□	□	□	□	□
16	I follow up student and teacher complaints about issues they face through the use of ICT tools, and work to resolve them.	□	□	□	□	□
17	I involve the Department of Education in solving problems related to lack of, or damage, to equipment.	□	□	□	□	□

18	I apply the principle of reward and punishment to teachers regarding ICT implementation.	□	□	□	□	□
19	I show my teachers all the circulars regarding the importance of using ICT in teaching and ask them to sign the circulars as evidence that they have been viewed.	□	□	□	□	□
20	It's not my responsibility to apply the ICT policy, it's the supervisors from the Ministry of Education who are responsible.	□	□	□	□	□
21	Other….					

- ***Section I: Satisfaction with ICT in school***

To what extent do you satisfied with the following points. Please rate your choice from Extremely Satisfied (1) to Extremely Dissatisfied (5).

	Satisfaction with ICT in school	Extremely Satisfied	Satisfied	Neither satisfied nor dissatisfied	Dissatisfied	Extremely Dissatisfied
1	The current situation (Availability and use of ICT tools) in your school	□	□	□	□	□
2	Support and supervision from the Ministry of Education	□	□	□	□	□
3	Outcome of using ICT tools in education	□	□	□	□	□
4	Student attitudes towards ICT	□	□	□	□	□
5	Quality of ICT tools	□	□	□	□	□
6	ICT Training	□	□	□	□	□
7	Development in the integration of ICT tools in your schools	□	□	□	□	□
8	Your ICT skills	□	□	□	□	□
9	Your role in ICT implementation	□	□	□	□	□
10	ICT policy (goals and clarity)	□	□	□	□	□
11	Staff collaboration in ICT	□	□	□	□	□
12	The internet service in your school	□	□	□	□	□

- ***Section J: Factors could make the implementation of ICT more successful***

To what extent do you think the following are important to make the implementation of ICT in your schools more successful?
Please rate your choice from very important to not important at all.

	Factors could make the implementation of ICT at schools more successful	Very important	Important	Neither important or un-important	Not important	Not important at all
1	Providing a sufficient number of ICT resources is…					
2	Providing good ICT training for school's staff is ….					
3	Providing appropriate building and infrastructure are….					
4	Clear ICT policy					
5	Headmaster's role in ICT implementation is…					
6	Teacher's role in ICT implementation is…					
7	Technical supports and maintenance are….					

8	Self-belief and motivation in using ICT in schools are…					
9	Changing misconceptions about using the internet at school is …					
10	Incentives and encouragement in using ICT are…					
11	Supervision from the Ministry of Education is…					

K. STRATEGIES THAT THAT YOU SUGGEST CAN ENHANCE ICT DEVELOPMENT

Further suggestions

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Thank you for your help

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Mobile: 00966505616310
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Appendix 2 (b)

Teacher – Questionnaire

- ***Section A: Personal information***

1- Gender: ☐Male ☐Female

2- Age:

Under 30	30-35	36-40	41-45	46-50	51-55	56-60
☐	☐	☐	☐	☐	☐	☐

3-Indicate with a (√) the number of your experience in educational field:

1-5	6-10	11-15	16-20	21-25	26 and more
☐	☐	☐	☐	☐	☐

4- Academic qualification

Other	Diploma	Bachelor degree	Master degree	PhD degree
☐	☐	☐	☐	☐

5-Indicate with a (√) the level of training courses that you may got of the following ICT's courses

	Level of ICT training in	Advanced	Good	Moderate	Poor	No Training
1	Basic Computer skills	☐	☐	☐	☐	☐
2	Microsoft word	☐	☐	☐	☐	☐
3	PowerPoint	☐	☐	☐	☐	☐
4	E-mail	☐	☐	☐	☐	☐
5	Website Design	☐	☐	☐	☐	☐
6	Internet browsing	☐	☐	☐	☐	☐
7	Printing	☐	☐	☐	☐	☐
8	Scanning	☐	☐	☐	☐	☐
9	Interactive Whiteboard	☐	☐	☐	☐	☐
10	Projector/ Data show	☐	☐	☐	☐	☐
11	Computer Maintenance	☐	☐	☐	☐	☐
12	Others…	☐	☐	☐	☐	☐

6- Indicate with a (√) how often you use ICT tools per day in your school

More than 3 hours	2-3 hours per day ay	Less than one hour per day	I don't use it
☐	☐	☐	☐

- ***Section B: Current situation of ICT tools***

Please indicate (√) to ICT Hardware/ Software which [Available/Un available] in your school.
Key: 5= Available with use at all times 4= Available with frequent use
3= Available with limited use 2= Available with no use at all 5= Not available at all

	Current situation of ICT tools	Available with use at all times	Available with frequent use	Available with limited use	Available with no use at all	Not available at all
1	Computer's lap	□	□	□	□	□
2	Access to Computer	□	□	□	□	□
3	Teachers Access to internet	□	□	□	□	□
4	Students Access to internet	□	□	□	□	□
5	Printer	□	□	□	□	□
6	Scanner	□	□	□	□	□
7	Interactive Whiteboard	□	□	□	□	□
8	Projector/Data show	□	□	□	□	□
9	TV	□	□	□	□	□
10	PowerPoint	□	□	□	□	□
11	Microsoft Word	□	□	□	□	□
12	Learning CDs/ DVD player	□	□	□	□	□
13	School website	□	□	□	□	□
14	Other……					

- ***Section C: Teachers ICT Skills.***

Please indicate with a (√) your level of ICT Skills. 5= Expert 4= Advanced level 3=Intermediate level 2= Beginner level 1= Non-existent

	Teachers ICT's Skills	Advance	Good	Moderate	Poor	No skill
1	Basic computer skills	□	□	□	□	□
2	Working using the internet	□	□	□	□	□
3	Microsoft Word	□	□	□	□	□
4	Using Interactive whiteboard	□	□	□	□	□
5	Fixing some computer problems and other ICT devices	□	□	□	□	□
6	Using Projector	□	□	□	□	□
7	Electronic communication with the Ministry of Education	□	□	□	□	□
8	Communicating with staff and students by email	□	□	□	□	□

Section D: ICT Application in School Teacher Functions

The following are some application of ICT that you deal with during school day. Please indicate the degree of agreement by putting √ on one of the most applicable to you.

Key: 5 = Always, 4 = Often, 3 = Sometimes, 2 = Rarely, 1= Never

	ICT Application in School Teacher Functions	Always	Often	Some-times	Rarely	Never
1	I use the internet to prepare my lessons	□	□	□	□	□
2	I use Microsoft word	□	□	□	□	□
3	I use PowerPoint	□	□	□	□	□
4	I use email in my work.	□	□	□	□	□
5	I communicate electronically with the Ministry of Education.	□	□	□	□	□
6	I use the computer to Prepare my lessons	□	□	□	□	□
7	I use the computer to write student exam questions.	□	□	□	□	□

8	I use the computer in students' progress reports	□	□	□	□	□
9	I use a projector in my lessons	□	□	□	□	□
10	I use an attractive whiteboard in my lessons.	□	□	□	□	□
11	I design educational programs for my classes.	□	□	□	□	□
12	I communicate with students and parents electronically.	□	□	□	□	□
13	I communicate with administration electronically	□	□	□	□	□
15	Other Functions...					

- ***Section E: Challenges Facing ICT Implementation***

The following are some challenges that you face in ICT implementation in your school. Please indicate the degree of agreement by indicating √ on one of the most applicable to you.
5= Strongly Agree, 4= Agree, 3 = Neutral, 2= Disagree, 1 = Strongly Disagree

	Challenges	S.A	Agree	Neutral	Disagree	S.D
1	Lack of financial resources	□	□	□	□	□
2	Lack of time to use ICT	□	□	□	□	□
3	Lack of ICT training's programmes	□	□	□	□	□
4	No or slow Internet access	□	□	□	□	□
5	Lack of building infrastructure	□	□	□	□	□
6	Teachers negative attitude	□	□	□	□	□
7	Lack of teachers awareness about the importance of ICT	□	□	□	□	□
8	Lack of appropriate space for the use of ICT	□	□	□	□	□
9	Lack of storage space	□	□	□	□	□
10	Lack of time for training	□	□	□	□	□
11	Lack of Teachers' experience in using ICT	□	□	□	□	□
12	Scheduling problems	□	□	□	□	□
13	Teacher's resistance to change.	□	□	□	□	□
14	Lack of supervision from the Ministry of Education	□	□	□	□	□
15	Lack of headmaster's supervision	□	□	□	□	□
16	Lack of maintenance	□	□	□	□	□
17	Lack of ICT tools	□	□	□	□	□
18	Lack of incentives and encouragement	□	□	□	□	□
19	Growing number of students	□	□	□	□	□
20	Students negative attitude	□	□	□	□	□
21	Lack of technical support	□	□	□	□	□
22	Traditions and beliefs	□	□	□	□	□
23	Lack of understanding of ICT's policy	□	□	□	□	□
24	Effect of climate on ICT	□	□	□	□	□
25	Lack of teachers collaboration	□	□	□	□	□
26	Lack of confidence	□	□	□	□	□
27	Lack of classroom management skills	□	□	□	□	□
28	Favouritism plays an important role ICT distribution	□	□	□	□	□
	Other barriers.					

- ***Section F: Teachers' perception towards ICT in education.***

We want to get your views about the application of ICT in education. Please indicate the degree of agreement by indicating (√) on the most applicable to you.
Key: 5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2= Disagree, 1= Strongly Disagree

	Your views about ICT in education	S.A	Agree	Neutral	Disagree	S.D
1	ICT has an important part to play in teaching and learning generally.	□	□	□	□	□
2	Using ICT is a dull activity	□	□	□	□	□
3	ICT makes work easier	□	□	□	□	□
4	ICT makes teaching enjoyable, changes routine, and keeps boredom at bay.	□	□	□	□	□
5	ICT improves students result.	□	□	□	□	□
6	Using ICT can save time and effort.	□	□	□	□	□
7	ICT increases cooperation between teachers and students	□	□	□	□	□
8	ICT improves teachers' and students' research skills	□	□	□	□	□
9	I am very interested in learning about ICT and use it	□	□	□	□	□
10	We need to prepare our schools for ICT before starting to apply it.	□	□	□	□	□
11	The money spent in the ICT sector is not worth it.	□	□	□	□	□
12	We need to train teachers before the introduction of technology so that it does not lose its importance.	□	□	□	□	□
13	We need to change the beliefs of some students and teachers about the importance of ICT in teaching and learning.	□	□	□	□	□
14	There is no effective use of ICT unless there is the principle of reward and punishment.	□	□	□	□	□
15	Traditional teaching and learning methods are better than teaching using ICT.	□	□	□	□	□
16	Using ICT is just a waste of time.	□	□	□	□	□
17	I don't encourage the use of the internet in schools because it is contrary to our traditions and customs	□	□	□	□	□
18	I prevent students from using the internet because some students tend to use it outside the range of learning activities.	□	□	□	□	□
19	I think it is a religious duty to ban the internet in secondary schools.	□	□	□	□	□
20	I forbid the use of the internet in my lessons, because high school students are at a critical age.	□	□	□	□	□
21	Other comment…	□	□	□	□	□

- ***Section G: Teacher's view towards the ICT policy***

We want to get your views and belief about the ICT policy Please indicate with a (√) the degree of agreement to the most applicable to you. Key: 5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2= Disagree, 1= Strongly Disagree

	Your view towards ICT's policy in Education	S.A	Agree	Neutral	Disagree	S.D
1	There is a weakness in explaining the ICT policy and its educational goals in education.	□	□	□	□	□
2	The ICT policy is just theory, it has not been applied practically.	□	□	□	□	□
3	It's not my business to implement the ICT policy; it's the role of the headmaster.	□	□	□	□	□
4	I receive encouragement and support from the headmaster when I use ICT in my lessons.	□	□	□	□	□
5	One of the duties of the Ministry of Education is to train teachers in advance about the education policy.	□	□	□	□	□
6	I don't need to know about the ICT policy because nobody is likely to ask me about it.	□	□	□	□	□

7	The ICT policy has a positive effect on my attitudes towards its use.	□	□	□	□	□
8	Frankly, I haven't heard of the Ministry of Education's policy.	□	□	□	□	□
9	The Ministry of Education is keen to raise teacher awareness about the importance of ICT.	□	□	□	□	□
10	I pay little attention to ICT due to the lack of clarity in the policy.	□	□	□	□	□
11	I have no idea about the ICT policy.	□	□	□	□	□
12	The Ministry of Education has developed clear goals and instructions on ICT implementation.	□	□	□	□	□
13	The ICT education policy is clear.	□	□	□	□	□
14	Other comment…					

- ***Section H: Teachers Role towards ICT***

The following are some Roles that you may do towards ICT implementation in your school. Please indicate the degree of agreement by indicating (√) on the most applicable to you.
Key: 5 = Always, 4 = Often, 3 = Sometimes, 2 = Rarely, 1= Never

	Your Roles toward ICT	Always	Often	Some-times	Rarely	Never
1	I involve students in the use of ICT in lessons.	□	□	□	□	□
2	I ask the headmaster to provide ICT tools and maintenance.	□	□	□	□	□
3	It's not my responsibility to provide ICT tools, it's the headmaster's role.	□	□	□	□	□
4	I encourage my students to search for information on the internet.	□	□	□	□	□
5	I advise and encourage my colleagues to use ICT in lessons.	□	□	□	□	□
6	I'm keen not to use any device before I learn how it works.	□	□	□	□	□
7	I ask students to pay attention to the safety of devices.	□	□	□	□	□
8	I'm keen to adhere to safety requirements for the students when using ICT.	□	□	□	□	□
9	I pay personally, if the school administration does not respond to maintenance issues.	□	□	□	□	□
10	One of my duties is to assess how students employ computers in their studies.	□	□	□	□	□
11	I 'm keen to learn about new developments in the world of technology to catch up with developed nations.	□	□	□	□	□
12	I'm keen to employ ICT tools in my lessons to change classroom routines.	□	□	□	□	□
13	I'm keen to provide an appropriate place to store ICT devices.	□	□	□	□	□
14	I follow up student complaints about what they face/need in their use of ICT tools, and strive to resolve problems.	□	□	□	□	□
15	I'm keen to do repairs and maintenance of ICT tools.	□	□	□	□	□
16	I'm keen to attend ICT training courses.	□	□	□	□	□
17	I involve students in the use of ICT in lessons.	□	□	□	□	□
18	Other comment…….					

- ***Section I: Satisfaction with ICT in school***

To what extent do you satisfied with the following points. Please rate your choice from Extremely Satisfied (1) to Extremely Dissatisfied (5).

	Level of Satisfaction with	Extremely Satisfied	Satisfied	Neither satisfied nor dissatisfied	Dissatisfied	Extremely Dissatisfied
1	The current situation (Availability and Use of ICT tools) in your school	□	□	□	□	□
2	Support and supervision from the Ministry of Education	□	□	□	□	□
3	Outcome of using ICT tools in education	□	□	□	□	□
4	Students attitude towards ICT	□	□	□	□	□
5	quality of ICT tools	□	□	□	□	□
6	ICT Training	□	□	□	□	□
7	Ongoing development in the integration of ICT tools in your school	□	□	□	□	□
8	Your ICT skills	□	□	□	□	□
9	Your role in towards ICT implementation	□	□	□	□	□
10	ICT policy (goals and clarity)	□	□	□	□	□
11	Collaboration in ICT (between staff)	□	□	□	□	□
12	The internet service in your school	□	□	□	□	□

- ***Section J: Factors could make the implementation of ICT more successful***

To what extent do you think the following are important to make the implementation of ICT in your schools more successful? Please rate your choice from very important (1) to not important at all (5).

	Factors could make the implementation of ICT at schools more successful	Very important	Important	Neither important or important	Not important	Not important at all
1	Sufficient number of ICT resources is…	□	□	□	□	□
2	Good training programmes in ICT	□	□	□	□	□
3	Appropriate buildings	□	□	□	□	□
4	A clear ICT policy	□	□	□	□	□
5	The role of the headmaster in ICT	□	□	□	□	□
6	The role of teachers in ICT	□	□	□	□	□
7	Technical supports and maintenance	□	□	□	□	□
8	Self-belief in using ICT	□	□	□	□	□
9	Changing some misconceptions about using the internet	□	□	□	□	□
10	The incentives and encouragements	□	□	□	□	□
11	The supervision from the Ministry of Education	□	□	□	□	□

I. STRATEGIES THAT CAN ENHANCE ICT DEVELOPMENT

Further suggestions for ICT development

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Appendix 2 (c)
Students- Questionnaire

- ***Section A: Personal Information***

1- Gender: Male ☐ Female ☐

2- Do you have a personal computer in your home? ☐**Yes** ☐**No**

3- If yes, how often do you use it per day?

☐ More than 3 Hours ☐ 3-2 Hours ☐ 1-2 Hours ☐ Less than one Hour ☐ I don't use it at all

- ***Section B: Current situation of ICT tools***

Please indicate (√) to ICT Hardware/ Software which [Available/Un available] in your school.
Key: 5= Available and used at all times 4= Available and used often times 3= Available and used in a limited way 2= Available is not used at all 5= Not available at all

	Availability and use of ICT	Available with use at all times	Available with frequent use	Available with limited use	Available with no use at all	Not available at all
1	Computer Lap	☐	☐	☐	☐	☐
2	student computer access	☐	☐	☐	☐	☐
3	Students internet access	☐	☐	☐	☐	☐
4	Printer	☐	☐	☐	☐	☐
5	Scanner	☐	☐	☐	☐	☐
6	Interactive Whiteboard	☐	☐	☐	☐	☐
7	Projector/ Data show	☐	☐	☐	☐	☐
8	CDs and DVD player	☐	☐	☐	☐	☐
9	TV	☐	☐	☐	☐	☐
10	PowerPoint	☐	☐	☐	☐	☐
11	Microsoft Word	☐	☐	☐	☐	☐
12	School website	☐	☐	☐	☐	☐
13	Other……					

Section C: Students ICT Skills.
Please indicate √ to the ICT skills that you have from advanced to no skills

	ICT Skills	Advanced	Good	Moderate	Poor	No skills
1	Level of Basic computer's skills	☐	☐	☐	☐	☐
2	Internet browsing	☐	☐	☐	☐	☐
3	Microsoft word	☐	☐	☐	☐	☐
4	PowerPoint	☐	☐	☐	☐	☐

- ***Section D: ICT Application in School Students' Functions***

The following are some application of ICT that you deal with during school day. Please indicate the degree of agreement by putting √ on one of the most applicable to you.
Key: 5 = Always, 4 = Often, 3 = Sometimes, 2 = Rarely, 1= Never

	Application of ICT in school activities	Always	Often	Sometimes	Rarely	Never
1	I use the internet for learning	□	□	□	□	□
2	I use Microsoft Word	□	□	□	□	□
3	I use PowerPoint	□	□	□	□	□
4	I use the internet in my school for chatting with people.	□	□	□	□	□
5	I use the computer to Prepare my homework	□	□	□	□	□

- ***Section E: Challenges Facing ICT Implementation***

The following are some challenges that you think face ICT implementation in your school. Please indicate the degree of agreement by indicating √ on one of the most applicable to you.
5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2= Disagree, 1 = Strongly Disagree

	Challenges	S.A	Agree	Neutral	Disagree	S.D
1	No, or slow, internet access	□	□	□	□	□
2	Lack of building infrastructure	□	□	□	□	□
3	Lack of available space to use ICT	□	□	□	□	□
4	Lack of teacher experience in ICT	□	□	□	□	□
5	Lack of headmaster supervision	□	□	□	□	□
6	Lack of maintenance	□	□	□	□	□
7	Lack of ICT tools	□	□	□	□	□
8	Growing number of students	□	□	□	□	□
9	Students' negative attitudes	□	□	□	□	□
10	Lack of technical support	□	□	□	□	□
11	Traditions and beliefs	□	□	□	□	□
12	Effect of climate on efficiency and performance of devices	□	□	□	□	□
13	Lack of collaboration	□	□	□	□	□
14	Teachers negative attitude	□	□	□	□	□
15	Lack of teacher skills	□	□	□	□	□
16	Other barriers…..					

- ***Section F: Student's View and Attitude towards ICT.***

We want to know your view and attitude toward ICT tools in education. Please indicate the degree of agreement by indicating (√) to the most one applicable to you.
Key: 5= Never- 4 = Agree - 3 = Neutral - 4 = Disagree - 5 = Strongly Disagree

	Attitude and belief towards ICT	S.A	Agree	Neutral	Disagree	S.D
1	I find using ICT tools in my school interesting	□	□	□	□	□
2	I learn best using ICT rather than traditional teaching methods.	□	□	□	□	□
3	ICT plays an important part in the learning process	□	□	□	□	□
4	I have a positive attitude towards ICT equipment	□	□	□	□	□
5	ICT improves my knowledge.	□	□	□	□	□
6	Using ICT can save time and effort.	□	□	□	□	□
7	ICT increases teacher and student cooperation.	□	□	□	□	□
8	ICT can improve student's research skills.	□	□	□	□	□
9	Using ICT is a dull activity	□	□	□	□	□
10	I feel helpless when my teacher asks me to do my homework on a computer.	□	□	□	□	□
11	Using ICT during lessons bores me.	□	□	□	□	□
12	Computers are unlikely to be important to me in my future.	□	□	□	□	□
13	I feel unhappy in the computer lab.	□	□	□	□	□
14	I hate talking with others about computers.	□	□	□	□	□
15	It's difficult to learn how to use a computer.	□	□	□	□	□
16	Other comment…….	□	□	□	□	□

- ***Section G: Your view about the role of the headmaster of your school towards ICT.***

Please indicate the degree of agreement by indicating (√) to the most one applicable to you.
5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2= Disagree, 1 = Strongly Disagree

	Views regarding the headmaster's role in ICT	S.A	Agree	Neutral	Disagree	S.D
1	I feel that the headmaster is interested in encouraging ICT in the learning process.	□	□	□	□	□
2	I feel that the headmaster is keen to develop and update the computer lab.	□	□	□	□	□
3	The headmaster continuously monitors the presence and use of ICT in lessons.	□	□	□	□	□
4	The school headmasters permits the use of the internet during the school day.	□	□	□	□	□
5	The headmaster encourages and supports us to use the computer lab throughout the whole school day.	□	□	□	□	□
7	The headmaster is responsible for following up the teachers' performance (e.g. if they don't use ICT in lessons).	□	□	□	□	□
8	The headmaster allows us to communicate with him/her electronically.	□	□	□	□	□
9	The headmaster is responsible for providing ICT tools and the maintenance of educational technology.	□	□	□	□	□
10	Other….					

- ***Section H: Students' views regarding the ICT tools and subject***

We want to know your feeling and view toward ICT tools and computer curriculum in your school. Please indicate the degree of agreement by indicating (√) to the most one applicable to you.
Key: 5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2= Disagree, 1 = Strongly Disagree

	Students' views regarding the ICT tools and subject	S.A	Agree	Neutral	Disagree	S.D
1	In my school, ICT devices are in good condition and high quality	□	□	□	□	□
2	All the safety facilities we need are available in my school.	□	□	□	□	□
3	Spaces are good enough in my school to use ICT	□	□	□	□	□
4	The internet works very well in my school.	□	□	□	□	□
5	My classroom's always set up in advance to use educational technology devices.	□	□	□	□	□
6	The facilities in the computer lab are good, e.g. tables, chairs, ink etc.	□	□	□	□	□
7	The computer lab is always clean and tidy.	□	□	□	□	□
8	There are enough computers in the computer lab for our lessons.	□	□	□	□	□
9	ICTs devices and applications need development	□	□	□	□	□
10	We apply in practice what we've learnt using computers.	□	□	□	□	□
11	The ICT subject is easy for me	□	□	□	□	□
12	The ICT subject's helped me to learn about computers	□	□	□	□	□
13	The ICT subject is weak and doesn't provide any new information/skills for students.	□	□	□	□	□
14	I already knew most of the computer skills before being taught.	□	□	□	□	□
15	The subject of ICT needs development.	□	□	□	□	□

16	The ICT subject is out of date and incompatible with most computer software.	□	□	□	□	□
17	Other comments……	□	□	□	□	□

- ***Section I: Student's views regarding teachers' roles in ICT***

We want to know your view towards teachers' use of ICT in your school. Please indicate the degree of agreement by indicating (√) to the most one applicable to you.
5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2= Disagree, 1 = Strongly Disagree

	Views regarding teachers' roles in ICT	S.A	Agree	Neutral	Disagree	S.D
1	Teachers in my school are NOT keen to use ICT tools during our lessons.	□	□	□	□	□
2	Teachers in my school allow us to get involved in ICT practically.	□	□	□	□	□
3	I feel that most of the teachers in my school are highly qualified in the use of ICT.	□	□	□	□	□
4	Teachers employ ICT in an appropriate way in lessons.	□	□	□	□	□
5	Teachers are keen to keep us safe, when they, or we, use ICT.	□	□	□	□	□
6	Teachers are NOT keen to maintain ICT devices during and after use.	□	□	□	□	□
7	Teachers are NOT keen to prepare for the use of ICT in advance.	□	□	□	□	□
8	I feel that some teachers deliberately don't use ICT in their lessons.	□	□	□	□	□
9	I feel that the teacher of computer is qualified	□	□	□	□	□
10	The teachers of computer processing lab before our presence	□	□	□	□	□
11	The computer teacher gives us instructions on how to use the computer.	□	□	□	□	□
12	The computer teacher lets us work in groups.	□	□	□	□	□
13	I receive encouragement from my computer teacher in my progression.	□	□	□	□	□
14	The computer teacher allows us to use the internet.	□	□	□	□	□
15	The computer teacher leaves us unsupervised during the lesson.	□	□	□	□	□
16	The computer teacher is keen to provide new learning skills in ICT	□	□	□	□	□
17	Other comment……					

- ***Section J: Satisfaction with ICT in school***

To what extent do you satisfied with the following points. Please rate your choice from Extremely Satisfied (1) to Extremely Dissatisfied (5).

	Satisfaction with ICT in school	Extremely Satisfied	Satisfied	Neither satisfied nor dissatisfied	Dissatisfied	Extremely Dissatisfied
1	Current situation (availability and use of ICT tools) in your school					
2	Educational outcome of using ICT tools					
3	The attitude of students towards ICT					
4	Quality of ICT tools					
5	Ongoing development in the integration of ICT tools in your school					
6	Your ICT skills					
7	Staff and student collaboration in ICT					
8	Internet service and quality in your school					

- ***Section K: Factors could make the implementation of ICT more successful***

To what extent do you think the following are important to make the implementation of ICT in your schools more successful? Please rate your choice from very important (1) to not important at all (5).

	Factors could make the implementation of ICT at schools more successful	Very important	Important	Neither important or important	Not important	Not important at all
1	Providing a sufficient number of ICT resources is…					
2	Providing good training programmes in ICT for school staff is ….					
3	Providing appropriate buildings and infrastructure are….					
4	The headmaster's role in ICT implementation is					
5	The teachers' role in ICT implementation is…					
6	Technical support and maintenance are….					
7	Changing some of the misconceptions about using the internet at school is …					
8	Supervision from the Ministry of Education is…					

I. STRATEGIES THAT CAN ENHANCE ICT DEVELOPMENT

Further suggestions for ICT development

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Thank you for your help

Researcher: Sultan Albugami
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Appendix 3 A

Interview Questions

The Director of Educational Technologies in the department of Education in Jeddah city

The Interview: **Sultan** **The Interviewee Code**: ( )
Date: / / 2014 **place**: ……**school**
Duration of the interview: ( ) Minutes
About the Interviewee: Qualification: **Experience**: **Age:**

1. Can you please describe the responsibilities and procedures involved in jobs in the department of educational technology in order to equip schools with ICT tools?
2. According to the huge budget of the Ministry of Education, why do you think some people believe that there is a deficiency in providing education technologies in schools?
3. How much is the budget for the school supplies section and how is it spent?
4. What is the mechanism used to equip and provide schools with the educational technologies?
5. In the case of maintenance requests, how long does it take to repair devices, and what are the devices that are most prone to malfunction?
6. What plans exist for the development of secondary schools in the city of Jeddah in order to be equipped with educational technologies?
7. From your observation in the maintenance workshop, what are the causes of equipment failure?
8. What are the difficulties and challenges that your department faces, and the causes of blocks in the implementation of education technologies in secondary schools?
9. What are the solutions from your point of view to ensuring the secondary classrooms are equipped and active with education technologies?
10. If you are asked to develop an effective framework to help the implementation of educational technologies in secondary schools, can you please describe what it will be?
11. How do you see the future of technology education in secondary schools?

Appendix 3 B

Interview Questions

The manager of Computer Department in the department of Education

The Interview: **Sultan** **The Interviewee Code**: ( )
Date: / / 2014 **place**: ……**school**
Duration of the interview: ( ) Minutes
About the Interviewee: Qualification: **Experience**: **Age:**

1. What are the tasks that are entrusted to the Centre of Information Technology?
2. What is the mechanism that your centre uses to provide computers for schools?
3. Why do you think there is a difficulty in the provision of services, despite the huge budget of the State for education? In your opinion, where is the problem?
4. What is the mechanism that you have to respond to the school requests regarding computer maintenance?
5. What are the future plans for the development of the computer curriculum, as well as for the computer labs in secondary schools?
6. What are the challenges and obstacles that hinder the provision of computers in secondary schools?
7. Schools complain of a lack of resources (computers, printers and internet). What are the solutions to assist them in the provision of these services and what are the solutions for such issues?
8. How do you perceive the future of secondary schools in terms of utilizing the computer?
9. Do you think the cause of these problems (the lack of provision and maintenance of computer labs and networks) are due to the school administration, the Centre for Information Technology, or the Ministry of Education? What are the solutions from your point of view?
10. Do you think that favouritism plays a role in this issue?

Appendix 3 C

Headmaster interview Questions

The Interview: **Sultan** **The Interviewee Code**: ( )
Date: / / 2014 **place**: ……**school**
Duration of the interview: ( ) Minutes
About the Interviewee: Qualification: **Experience**: **Age:**

1. Do you prefer the traditional way of teaching or using educational technology for teaching and why?
2. Could you please describe the current situation on the use of educational technology in your school? And what hardware and software are available?
3. In your job, how do you use educational technology? And what motivates you to use educational technology in your job?
4. What role do you play in helping the implementation of ICT in your school, and how do you describe your teachers' role in this?
5. What role do you play in providing and implementing ICT resources in your school?
6. What do you think are the challenges and obstacles that prevent the application of technology education in your school, and are these problems related to the adequacy of devices, time, financial problems, lack of training or other problems?
7. What do you think are the solutions to solve such problems?
8. What you think about the education policy in ICT, and what role do you play to implement ICT in your school?
9. How do you see the future of secondary schools in Saudi Arabia from the perspective of the current use of educational technology? And what do you wish for in the future?

Appendix 3 D

Teachers interview Questions

The Interview: **Sultan** **The Interviewee Code**: ( )
Date: / / 2014 **place**: ……**school**
Duration of the interview: ( ) Minutes
About the Interviewee: **Qualification:** **Experience**: **Age**

1. What do you prefer: the traditional way of teaching or using educational technology?
2. Describe your current situation regarding the implementation of educational technology in your classroom? What devices are available for you?
3. What motivates you to use educational technology in your classroom?
4. What do you think are the benefits obtained by the student and the teacher from the use of educational technology in the classroom?
5. What do you think hinders the application of educational technology in your school? Are the problems related to the adequacy of devices, time, financial problems, lack of training or other issues?
6. What do you think are the solutions to such problems?
7. What role do you play in implementing ICT in your lessons?
8. How would you describe the response of the school administration in solving problems that are related to ICT?
9. What you know about the education policy in ICT, and what role do you play in implementing ICT in your school?
10. What do you wish to see in the future for ICT in secondary schools?

Appendix 3 E

Students interview Questions

The Interview: **Sultan** **The Interviewee Code**: ( )
Date: / / 2014 **place**: ……**school**
Duration of the interview: ( ) Minutes
About the Interviewee: Qualification: **Experience**:

1. What are your views on the introduction and use of ICT in your classroom?
2. Do you prefer traditional methods of teaching or teaching using technology and why?
3. What is the current situation related to the use of ICT in your classroom?
4. What devices are available for you as a student in the classroom and in the computer lab, and what do you feel about that?
5. Describe your own and your friends' behaviour when using ICT devices?
6. What do you think hinders the application of ICT in your school? What do you think are the solutions to such problems?
7. How would you describe the role of the school administration and teachers in ICT and solving problems related to ICT?
8. What do you wish for ICT in the future in your school?

Appendix 4
Qualitative analysis procedure

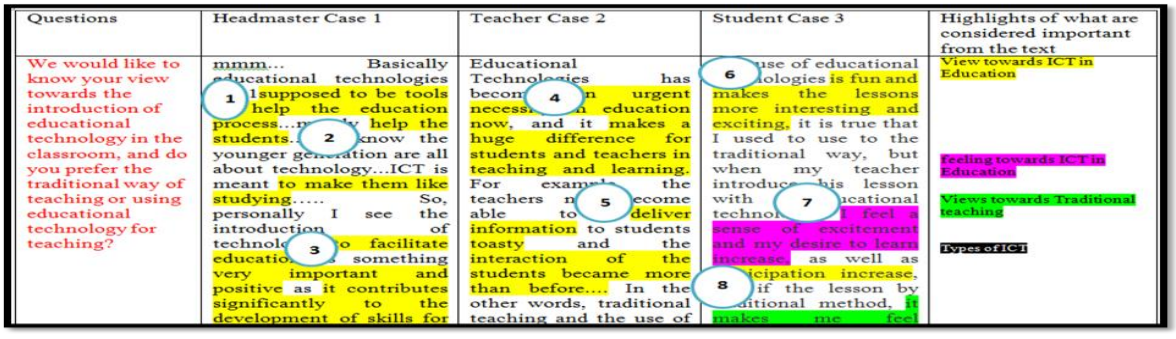
- **Stage One: Familiarisation with data**

The interviews' texts were listened to many times, after transcribing, and then the transcripts were read many times with the aim of becoming deeply immersed in the data. This helped to highlight what was considered important to the research issue in order to find indicators of categories in the interviews' text.

- **Stage Two: Creating initial codes**

After reviewing indicators of categories in the interviews' text, the next step was to identify those indicators by coding them to create 'Initial Codes'. This coding category continued until achieved either 'informational redundancy' or 'theoretical saturation' (Glaser, 1978). Accordingly, the researcher started to find codes, which could be relevant to the research issue. The aim of coding stage was to create links between different patterns and to find if there are relationships between them. In addition, this step will makes the analysis of data easier. It should be noted that the researcher was aware not to leave any piece of data without coding, except the word that considered unrelated to the research issue (Field & Morse, 1985).

In searching for ways to creating initial codes, the study used, in this stage, Microsoft Office (manual method). To achieve this, many lists have been created and various colours were utilised to code different classes of reactions and opinions from the 14 cases. Any words or phrases that might related to the research questions were highlighted. On doing so, the lists were divided into three parts; left, centre and right. The left side has the entire interview questions, and the centre has the entire interview, which took place between the researcher and the participant. The right side has the initially codes which might related to the research objectives and questions. The figure below, an example, shows how the researcher examined the interviews' sheets in order to find some tendencies of the different codes from the material.



Questions	Headmaster Case 1	Teacher Case 2	Student Case 3	Highlights of what are considered important from the text
We would like to know your view towards the introduction of educational technology in the classroom, and do you prefer the traditional way of teaching or using educational technology for teaching?	mmm… Basically educational technologies [1] supposed to be tools help the education process…n[2] know the younger ge[2]ation are all about technology…ICT is meant to make them like studying….. So, personally I see the introduction of technolo[3] facilitate educatio[3] something very important and positive as it contributes significantly to the development of skills for	Educational Technologies has becom[4] n urgent necessi[4] education now, and it makes a huge difference for students and teachers in teaching and learning. For exam[5] the teachers n[5] ecome able to [5] deliver information to students toasty and the interaction of the students became more than before…. In the other words, traditional teaching and the use of	[6] se of educational [6] ologies is fun and makes the lessons more interesting and exciting, it is true that I used to use to the traditional way, but when my teacher introduc[7] his lesson with [7] ucational technol[7] I feel a sense of excitement and my desire to learn increase as well as [8] icipation increase, [8] if the lesson by [8] ditional method, it makes me feel	View towards ICT in Education feeling towards ICT in Education Views towards Traditional teaching Types of ICT

At the final step in this stage, the initial codes reviewed again, and counted. The final initial codes that found were 493.

- **Stage Three: searching for themes**

In this stage, it was necessary to review the 493 initial codes to find if there are relationships or similarities between them. It is axiomatic, because we are dealing with educational issues and we were asking the same questions to the participants, in the same field (secondary school). Therefore, the aim of this process was to gather all data relevant to each potential themes (two main themes and seven sub-themes) that identified in the study conceptual framework. For example, any code indicated to lack of resources, lack of training, lack of support or lack of maintenance classified under the theme of the government role and responsibilities, and so on. In addition, to ensure the absence of any code does not belong to the initial themes category.

- **Stage Four: Reviewing the Themes**

Checking if themes work in relation to the coded extracts, and the entire data set, generating a thematic 'map' of the analysis in order to create the final themes and sub-themes from the initial themes. Practically, the themes were reviewed for simple reason that some themes can be merged to form a single theme and some single themes might have more than sub themes. For example, the study found school headmaster role's theme and teachers role's theme could be brought under new theme 'School Role and Responsibilities' On the other hand, for example, challenges' theme could divided into two sub themes, external challenges and internal challenges. Therefore, this stage aims to refine the specifics of each theme, and the overall story the analysis tells, generating clear definitions and names for each theme. The next section explains the two main themes and seven sub-themes.

- **Stage Five explain the themes:**

In order to explain the final themes and subthemes it was necessary to find an appropriate software that might help in categorising and analysing the data and might help in build mind maps. Among different qualitative software, the study used Nvivo software package to assist the analysis of qualitative data. This software helps in coding, categorisation and recovery of data in more organised and manageable ways (Wiredu, 2014). Therefore, all themes, sub-themes codes and participants' demographic details were entered in the Nvivo software.

APPENDIX 5
SPSS output
I. HEADMASTERS AND TEACHERS RELIABILITY
(CRONBACH'S ALPHA FOR SCALES' INTERNAL CONSISTENCY)

ICT Training Reliability

Scale A: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	115	88.5
	Excluded[a]	15	11.5
	Total	130	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.918	11

Current situation Reliability
Scale B: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	28	21.5
	Excluded[a]	102	78.5
	Total	130	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.817	14

ICT Skills Reliability
Scale C: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	120	92.3
	Excluded[a]	10	7.7
	Total	130	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.913	8

Teachers' ICT usage Reliability
Scale D: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	80	61.5
	Excluded[a]	50	38.5
	Total	130	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.887	13

Headmasters' ICT usage Reliability
Scale E: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	28	21.5
	Excluded[a]	102	78.5
	Total	130	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.796	13

Challenges Reliability
Scale F: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	105	80.8
	Excluded[a]	25	19.2
	Total	130	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.875	28

Views and attitudes towards ICT Reliability
Scale G: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	113	86.9
	Excluded[a]	17	13.1
	Total	130	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.847	20

Teacher's Role towards ICT Reliability
Scale H: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	87	66.9
	Excluded[a]	43	33.1
	Total	130	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.877	16

Headmaster's Role towards ICT Reliability
Scale I: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	20	15.4
	Excluded[a]	110	84.6
	Total	130	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.887	20

ICT policy (views and understanding) Reliability
Scale J: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	88	67.7
	Excluded[a]	42	32.3
	Total	130	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.826	13

Reliability of Satisfaction Level
Scale K: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	130	100.0
	Excluded[a]	0	.0
	Total	130	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.891	12

Reliability of Important ICT factors
Scale L: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	130	100.0
	Excluded[a]	0	.0
	Total	130	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.892	11

2. STUDENTS' RELIABILITY (CRONBACH'S ALPHA FOR SCALES' INTERNAL CONSISTENCY)

Reliability of (ICT Availability and Use)
Scale A: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	73	73.0
	Excluded[a]	27	27.0
	Total	100	100.0

Reliability Statistics

Cronbach's Alpha	N of Items
.708	12

Reliability of (ICT Skills)
Scale B: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	99	99.0
	Excluded[a]	1	1.0
	Total	100	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.866	4

Reliability of (ICT in school function)
Scale C: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	96	96.0
	Excluded[a]	4	4.0
	Total	100	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.782	5

Reliability of (ICT Challenges)
Scale D: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	79	79.0
	Excluded[a]	21	21.0
	Total	100	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.808	15

Reliability of (Views and Attitudes towards ICT)
Scale E: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	75	75.0
	Excluded[a]	25	25.0
	Total	100	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.902	15

Reliability of (Headmasters' Role towards ICT)
Scale F: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	84	84.0
	Excluded[a]	16	16.0
	Total	100	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.827	9

Reliability of (ICT subject and ICT tools)
Scale G: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	70	70.0
	Excluded[a]	30	30.0
	Total	100	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.701	16

Reliability of (Teachers' Role towards ICT)
Scale H: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	78	78.0
	Excluded[a]	22	22.0
	Total	100	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.732	16

Reliability of (Satisfaction)
Scale I: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	96	96.0
	Excluded[a]	4	4.0
	Total	100	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.829	8

Reliability of (Important ICT factors)
Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	95	95.0
	Excluded[a]	5	5.0
	Total	100	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.848	8

A correlation coefficient matrix between variables for teachers and headmasters

Correlations													
		ICT training	Current situation	ICT skills	Teachers' Usage	headmasters Usage	Challenges	Views	Teacher's role	Headmaster's role	ICT policy	Satisfaction	Importance ICT factors
ICT training	Pearson Correlation	1											
	Sig. (2-tailed)												
	N	129											
Current situation	Pearson Correlation	.289**	1										
	Sig. (2-tailed)	.001											
	N	129	130										
ICT skills	Pearson Correlation	.622**	.203*	1									
	Sig. (2-tailed)	.000	.021										
	N	129	129	129									
ICT usage: teachers	Pearson Correlation	.620**	.422**	.601**	1								
	Sig. (2-tailed)	.000	.000	.000									
	N	100	101	100	101								
ICT usage: headmasters	Pearson Correlation	.443*	.275	.495**	.c	1							
	Sig. (2-tailed)	.018	.156	.007	.								
	N	28	28	28	0	28							
Challenges	Pearson Correlation	-.048	-.123	.006	-.154	.218	1						
	Sig. (2-tailed)	.591	.164	.949	.123	.266							
	N	129	130	129	101	28	130						
Views	Pearson Correlation	-.377**	-.194*	-.155	-.138	.050	-.137	1					
	Sig. (2-tailed)	.000	.027	.079	.169	.802	.119						
	N	129	130	129	101	28	130	130					
Teacher's role	Pearson Correlation	.201*	.336**	.342**	.389**	.c	-.207*	-.133	1				
	Sig. (2-tailed)	.044	.001	.000	.000	.	.037	.181					
	N	101	102	101	101	0	102	102	102				
Headmaster's role	Pearson Correlation	.094	.009	.592**	.c	.532**	.296	.247	.c	1			
	Sig. (2-tailed)	.634	.964	.001	.	.004	.126	.205	.				
	N	28	28	28	0	28	28	28	0	28			
ICT policy	Pearson Correlation	.032	.193*	-.018	.126	.305	-.240**	.318**	.036	.032	1		
	Sig. (2-tailed)	.722	.028	.843	.211	.114	.006	.000	.718	.871			
	N	129	130	129	101	28	130	130	102	28	130		
Average satisfaction	Pearson Correlation	.097	.008	.138	.095	.091	-.056	.018	.178	.413*	-.084	1	
	Sig. (2-tailed)	.273	.927	.120	.346	.646	.525	.838	.073	.029	.342		
	N	129	130	129	101	28	130	130	102	28	130	130	
Average importance ICT factors	Pearson Correlation	-.025	-.104	.048	-.080	.121	-.018	.004	-.001	.315	.036	.030	1
	Sig. (2-tailed)	.778	.238	.586	.428	.539	.840	.966	.994	.103	.688	.732	
	N	129	130	129	101	28	130	130	102	28	130	130	130
*. Correlation is significant at the 0.05 level (2-tailed).													
**. Correlation is significant at the 0.01 level (2-tailed).													

A correlation coefficient matrix between variables for students

Correlations											
		ICT Availability	Satisfaction	Importance	ICT Skills	ICT Implementation	ICT Challenges	ICT Attitudes	Administrator's Role	Current Situation	Teacher's Role
ICT Availability	Pearson Correlation	1									
	Sig. (2-tailed)										
	N	100									
Satisfaction	Pearson Correlation	-.123	1								
	Sig. (2-tailed)	.223									
	N	100	100								
Importance	Pearson Correlation	.094	-.003	1							
	Sig. (2-tailed)	.353	.979								
	N	100	100	100							
ICT Skills	Pearson Correlation	.192	-.065	.098	1						
	Sig. (2-tailed)	.055	.520	.334							
	N	100	100	100	100						
ICT Implementation	Pearson Correlation	.232*	.078	.166	.296**	1					
	Sig. (2-tailed)	.020	.443	.098	.003						
	N	100	100	100	100	100					
ICT Challenges	Pearson Correlation	-.190	.115	.076	.093	-.014	1				
	Sig. (2-tailed)	.058	.256	.451	.355	.888					
	N	100	100	100	100	100	100				
ICT Attitudes	Pearson Correlation	.059	-.023	.108	.347**	-.006	-.126	1			
	Sig. (2-tailed)	.560	.821	.283	.000	.955	.212				
	N	100	100	100	100	100	100	100			
Headmasters' Role	Pearson Correlation	.042	.012	.041	-.102	.383**	-.176	-.276**	1		
	Sig. (2-tailed)	.679	.904	.689	.312	.000	.080	.005			
	N	100	100	100	100	100	100	100	100		
Current Situation	Pearson Correlation	.106	.143	-.046	-.021	.202*	-.233*	-.047	.559**	1	
	Sig. (2-tailed)	.296	.157	.651	.839	.043	.020	.642	.000		
	N	100	100	100	100	100	100	100	100	100	
Teachers' Role	Pearson Correlation	-.015	.056	-.083	.165	.282**	-.121	.018	.329**	.497**	1
	Sig. (2-tailed)	.879	.578	.414	.101	.005	.229	.857	.001	.000	
	N	100	100	100	100	100	100	100	100	100	100
*. Correlation is significant at the 0.05 level (2-tailed).											
**. Correlation is significant at the 0.01 level (2-tailed).											

Appendix 6 (A)

إستبانة المدراء

الجزء الاول : المعلومات الشخصية

الجنس ذكر ☐ انثى ☐

العمر:

56-60	51-55	46-50	41-45	36-40	30-35	اقل من 30
☐	☐	☐	☐	☐	☐	☐

7- الخبرات في مجال التربية

26 سنة واكثر	21-25	16-20	11-15	6-10	1-5
☐	☐	☐	☐	☐	☐

8- المؤهل التعليمي

دكتوراه	ماجستير	بكالوريوس	دبلوم	اخرى
☐	☐	☐	☐	☐

9- الدورات التدريبة في مجال تكنولوجيا التعليم

لا يوجد تدريب	ضعيف	متوسط	جيد	متقدم	مستوى التدريب	
☐	☐	☐	☐	☐	القواعد الاساسية في الكمبيوتر	1
☐	☐	☐	☐	☐	برنامج معالجة النصوص	2
☐	☐	☐	☐	☐	برنامج البوربوينت	3
☐	☐	☐	☐	☐	البريد الالكتروني	4
☐	☐	☐	☐	☐	تصميم صفحات الويب	5
☐	☐	☐	☐	☐	تصفح الانترنت	6
☐	☐	☐	☐	☐	الطباعة	7
☐	☐	☐	☐	☐	نسخ الملفات عبر الاسكان	8
☐	☐	☐	☐	☐	السبورة الذكية	9
☐	☐	☐	☐	☐	جهاز عرض البيانات	10
☐	☐	☐	☐	☐	صيانة الكمبيوتر	11
☐	☐	☐	☐	☐	اجهزة اخرى	12

10- الاستخدام اليومي للكمبيوتر في اليوم الدراسي

لا استخدمه	اقل من ساعة في اليوم	من 2-3 ساعة في اليوم	اكثر من 3 ساعات
☐	☐	☐	☐

- ***توافر واستخدام اجهزة تقنيات التعليم في مدرستك***
- ***قم بالتأشير على الاجهزة المتوفرة في مدرستك ومدى استخدامها***

	اجهزة تكنولوجيا التعليم في مدرستك	متوفر ويستخدم باستمرار	متوفر مع استخدام شبه يومي	متوفر مع استخدام محدود	متوفر ولا يستخدم	غير متوفر
1	معمل حاسب الي	□	□	□	□	□
2	الوصول الى الكمبيوتر	□	□	□	□	□
3	توافر للانترنت للاداريين	□	□	□	□	□
4	توافر للانترنت للمعلمين	□	□	□	□	□
5	توافر للانترنت للطلاب	□	□	□	□	□
6	طابعة	□	□	□	□	□
7	سكانر	□	□	□	□	□
8	سبورة ذكية	□	□	□	□	□
9	عارض بيانات	□	□	□	□	□
10	فيديو /دي في دي	□	□	□	□	□
11	تلفاز	□	□	□	□	□
12	بوربوينت	□	□	□	□	□
13	معالج النصوص وورد	□	□	□	□	□
14	موقع للمدرسة على الانترنت	□	□	□	□	□
15	اجهزة اخرى					

- ***مستوى مهارة تكنولوجيا التعليم لديك***

	مستوى مهارة تكنولوجيا التعليم	متقدم	جيد	متوسط	ضعيف	لا يوجد مهارات
1	القواعد الاساسية في استخدام الكمبيوتر	□	□	□	□	□
2	استخدام الانترنت للمهام اليومية في العمل	□	□	□	□	□
3	استخدام برنامج معالجة النصوص	□	□	□	□	□
4	استخدام برنامج عارض الشرائح (بوربوينت)	□	□	□	□	□
5	اصلاح بعض مشاكل واعطال الكمبيوتر وكذلك بعض اجهزة تكنولوجيا التعليم	□	□	□	□	□
6	تدريب الاخرين على استخدام اجهزة تكنولوجيا التعليم	□	□	□	□	□
7	التعامل الكترونيا مع وزارة التربية والتعليم	□	□	□	□	□
8	التواصل مع اعضاء هيئة التدريس والاباء الكترونيا	□	□	□	□	□

- ***تطبيق استخدام التقنية في مهام مدير المدرسة اليومية***

	تطبيق استخدام التقنية في مهام مدير المدرسة اليومية	دائما	غاليا	بعض الاحيان	نادرا	ابدا
1	تصفح الانترنت	□	□	□	□	□
2	برنامج معالجة النصوص	□	□	□	□	□
3	برنامج البور بوينت	□	□	□	□	□
4	استخدم البريد الالكتروني	□	□	□	□	□
5	التواصل مع وزارة التربية والتعليم	□	□	□	□	□
6	بناء الجدول المدرسي	□	□	□	□	□
7	رسم خطط العمل	□	□	□	□	□
8	تقارير تقدم الطلاب	□	□	□	□	□
9	تقييم المعلمين	□	□	□	□	□

10	تقارير اداء المعلمين	□	□	□	□	□
11	بيانات تسجيل الطلاب	□	□	□	□	□
12	وضع مهام العاملين في المدرسة الكترونيا	□	□	□	□	□
13	التواصل مع اعضاء هيئة التدريس الكترونيا	□	□	□	□	□
14	التواصل مع الطلاب والاباء الكترونيا	□	□	□	□	□
15	مهام اخرى					

- ***التحديات في تطبيق استخدام التقنية في مدرستك***

	التحديات	اوافق بشده	اوافق	معتدل	لا اوافق	لا اوافق بشده
1	ضعف الموارد المالية	□	□	□	□	□
2	محدودية الوقت لاستخدامها	□	□	□	□	□
3	ضعف في نوعية برامج التدريب المقدمة	□	□	□	□	□
4	عدم وجود او ضعف في شبكة الانترنت	□	□	□	□	□
5	ضعف البنية التحتية					
6	تصورات خاطئة لدى بعض المعلمين حول فوائد التقنية في التعليم	□	□	□	□	□
7	مشاكل متعلقة باوقات التدريب	□	□	□	□	□
8	قلة وعي لدى بعض المعلمين حول اهمية التقنية في مجال التعليم	□	□	□	□	□
9	ضعف في المساحة لإستخدامها	□	□	□	□	□
10	قلة الاماكن لحفظ الاجهزة	□	□	□	□	□
11	قلة خبرة المعلم	□	□	□	□	□
12	مشاكل في الجدول المدرسي	□	□	□	□	□
13	مقاومة المعلم للتغيير	□	□	□	□	□
14	ضعف الاشراف من قبل وزارة التعليم	□	□	□	□	□
15	ضعف الصيانة	□	□	□	□	□
16	قلة في كمية ادوات تكنولوجيا التعليم المطلوبة	□	□	□	□	□
17	ضعف التشجيع والحوافز	□	□	□	□	□
18	ازدياد عدد الطلاب في الفصل	□	□	□	□	□
19	سلوكيات سيئة من بعض الطلاب تجاه الاجهزة	□	□	□	□	□
20	ضعف الدعم الفني	□	□	□	□	□
21	العادات والتقاليد تؤثر على بعض مستخدمي الانترنت	□	□	□	□	□
22	ضعف في فهم سياسة التعليم تجاه استخدام واهمية التقنية	□	□	□	□	□
23	تأثير المناخ على كفاءة وعمل الاجهزة مثل الرطوبة, الحرارة وكذلك الغبار	□	□	□	□	□
24	ضعف تعاون المعلمين	□	□	□	□	□
25	ضعف الثقة عند استخدامها	□	□	□	□	□
26	ضعف في مهارة بعض المعلمين لإدارة الصف	□	□	□	□	□
27	المحسوبية ودورها في توزيع الاجهزة بعدالة على المدارس	□	□	□	□	□
28	ضعف الاشراف من قبل مدير المدرسة	□	□	□	□	□
	تعليق اخر	□	□	□	□	□

- ***رأي مدير المدرسة نحو ادماج التقنية في التعليم***

	رأيك في استخدام اجهزة التقنية في التعليم	اوافق بشده	اوافق	معتدل	لا اوافق	لا اوافق بشده
1	بصفة عامة تلعب ادوات تقنيات التعليم دورا هاما في عملية التعلم	□	□	□	□	□
2	استخدام التقنية في التعليم هي عملية مملة	□	□	□	□	□
3	استخدام تقنيات التعليم في التدريس تجعل العمل اسهل	□	□	□	□	□
4	تجعل العمل ممتع وتبعد الروتيين	□	□	□	□	□
5	تطور نتائج الطلاب	□	□	□	□	□

6	تخفظ الوقت	□	□	□	□	□
7	تزيد التعاون بين الطلاب والمعلم	□	□	□	□	□
8	تطور مهارات البحث لكل من الطلاب والمعلمين	□	□	□	□	□
9	انا متحمس للتعلم حول تقنيات التعليم	□	□	□	□	□
10	نحتاج تهيئة المباني المدرسية مبكرا قبل ادماج التقنية فيها	□	□	□	□	□
11	الاموال التي تصرف على تقنيات التعليم لا تستحق هذا	□	□	□	□	□
12	نحتاج تدريب المعلمين مبكرا قبل ان نطلب منهم استخدام هذه الادوات تفاديا للاعطال والملل من استخدامها	□	□	□	□	□
13	نحتاج تغيير بعض الافكار الخاطئة لدى بعض المعلمين والطلاب حول اهمية ادوات تكنولوجيا التعليم	□	□	□	□	□
14	لا يمكن ان يكون هنالك تأثير من استخدام ادوات التقنية قبل ان يكون هنالك مبدأ الثواب والعقاب	□	□	□	□	□
15	الطرق التقليدية في التعليم هي افضل من استخدام التقنية	□	□	□	□	□
16	استخدام ادوات التقنية مجرد مضيعة للوقت	□	□	□	□	□
17	لا اشجع استخدام الانترنت في مدرستي لانه يتعارض مع عاداتنا وقيمنا	□	□	□	□	□
18	امنع استخدام الانترنت في مدرستي لان بعض الطلاب يميلون لاستخدامه في اغراض ليست تعليمية	□	□	□	□	□
19	من منظور ديني اعتقد انه يجب منع الانترنت في المدارس	□	□	□	□	□
20	امنع استخدام الانترنت في مدرستي لأن طلاب المرحلة الثانوية هم في سن حرج ويحتاج المراقبة	□	□	□	□	□
21	اخرى					

- ***وجهة نظرك حول سياسة التعليم تجاه استخدام ادوات تكنولوجيا التعليم***

	وجهة نظرك حول سياسة التعليم تجاه استخدام ادوات تكنولوجيا التعليم	اوافق بشدة	اوافق	معتدل	لا اوافق	لا اوافق بشده
1	سياسة تكنولوجيا التعليم غبر واضحة	□	□	□	□	□
2	اثرت سياسة التعليم ايجابا نحو استخدامي لتكنولوجيا التعليم في عملي	□	□	□	□	□
3	تطبيق سياسة التعليم ليست مسؤليتي , بل مسؤلية وزارة التربية	□	□	□	□	□
4	اولي اهتماما ضعيفا لسياسة التعليم وذلك لعدم وضوحها	□	□	□	□	□
5	سياسة التعليم مجرد نظريات لم تطبق على ارض الواقع	□	□	□	□	□
6	هنالك ضعف في شرح اهداف وتوجهات سياسة التعليم	□	□	□	□	□
7	القى دعما وتشجيعا من الوزارة عند تطبيق سياسة التعليم	□	□	□	□	□
8	لا املك اي فكرة عن سياسة التعليم	□	□	□	□	□
9	لدى وزارة التربية والتعليم اهتمام بالغ لرفع الوعي حول سياسة التعليم	□	□	□	□	□
10	لم توفر الوزارة اي تطوير لسياستها التعليمية	□	□	□	□	□
11	انها مسؤلية وزارة التربية لرفع وعي المعلمين مسبقا عن سياستها التعليمية	□	□	□	□	□
12	لا احتاج ان اعرف شيئا عن سياسة التعليم لانه لن يسألني احدا عنها	□	□	□	□	□
13	حقيقة, لم اسمع مسبقا عن سياسة التعليم	□	□	□	□	□
14	اخرى					

- ***دور مدير المدرسة نحو سياسة التعليم وتطبيقها***

	• ***دور مدير المدرسة نحو سياسة التعليم وتطبيقها***	دائما	غالبا	بعض الاوقات	نادرا	ابدا
1	انا حريص على توفير اجهزة تقنيات التعليم باستمرار في مدرستي	□	□	□	□	□
2	اشجع معلمي المدرسة على استخدام اجهزة تقنيات	□	□	□	□	□
3	واحد من واجباتي الادارية هو تقييم عمل المعلم من حلال تطبيق استخدام ادوات اجهزة تقنيات التعليم	□	□	□	□	□

4	حريص على توفير دورات تدريبية للمعلمين حول استخدام ادوات اجهزة تقنيات التعليم	□	□	□	□	□
5	حريص على توفير الصيانة ل ادوات اجهزة تقنيات التعليم	□	□	□	□	□
6	احرص على تشجيع المعلمين على حضور دورات تدريبية في مجال اجهزة تقنيات التعليم	□	□	□	□	□
7	حريص ان يستخدم جميع المعلمين ادوات اجهزة تقنيات التعليم في دروسهم	□	□	□	□	□
8	احرص على توفير شروط السلامة عند استخدام ا ادوات اجهزة تقنيات التعليم	□	□	□	□	□
9	احرص على توضيح اهمية ادوات اجهزة تقنيات التعليم للمعلمين	□	□	□	□	□
10	احرص على توفير المكان المناسب لحفظ ادوات اجهزة تقنيات التعليم	□	□	□	□	□
11	احرص ان يكون معمل الحاسب الالي مفتوح للمعلمين والطلاب في جميع الاوقات	□	□	□	□	□
12	احرص ان تكون البيئة التعليمية اكثر جاذبية من خلال توفير ادوات اجهزة تقنيات التعليم	□	□	□	□	□
13	باستمرار احرص ان يولي المعلم والطالب انتباها لسلامتهم الشخصية وكذلك سلامة الاجهزة عند استخدامها	□	□	□	□	□
14	اطلب من المعلمين اشراك الطلاب عند استخدام ادوات اجهزة تقنيات التعليم	□	□	□	□	□
15	اشجع استخدام الانترنت من قبل المعلمين والطلاب خلال اليوم الدراسي	□	□	□	□	□
16	اتابع طلبات المعلمين والطلاب حول ما يحتاجون من ادوات اجهزة تقنيات التعليم واعمل على توفيرها	□	□	□	□	□
17	اشرك الوزارة معي في جميع المشاكل المتعلقة بادوات اجهزة تقنيات التعليم	□	□	□	□	□
18	اتبع مبدأ الثواب والعقاب عند استخدام او اهمال ادوات اجهزة تقنيات التعليم	□	□	□	□	□
19	اجعل جميع المعلمين يطلعون على كل التعاميم وماهو جديد حول استخدام ادوات تكنولوجيا التعليم واطلب توقيعهم بالعلم	□	□	□	□	□
20	ليست مسؤوليتي تطبيق سياسة التعليم, بل هو دور مشرفي وزارة التربية والتعليم	□	□	□	□	□
21	تعليق اخر					

- ***مستوى الرضا عن الوضع الحالي لأدوات تكنولوجيا التعليم في مدرستك***

الى اي مدى انت راض عن النقاط التالية

	مستوى الرضا عن الوضع الحالي لأدوات تكنولوجيا التعليم في مدرستك	راض بشدة	راض	معتدل	لست راض	لست راض بشدة
1	الوضع الحالي من حيث توافر الاجهزة	□	□	□	□	□
2	الدعم والتشجيع من وزارة التعليم	□	□	□	□	□
3	الفوائد والنتائج الملموسة من استخدام ادوات التكنولوجيا في التعليم	□	□	□	□	□
4	سلوكيات بعض الطلاب تجاه ادوات التعليم التقنية	□	□	□	□	□
5	جودة اجهزة تقنيات التعليم	□	□	□	□	□
6	التدريب المقدم حول ادوات التقنية	□	□	□	□	□
7	التقدم في توفير اجهزة التعليم التقنية	□	□	□	□	□
8	مهاراتك حول استخدام تكنولوجيا التعليم	□	□	□	□	□
9	دورك تجاه تكنولوجيا التعليم	□	□	□	□	□
10	وضوح واهداف سياسة التعليم	□	□	□	□	□
11	التعاون بين اعضاء هيئة التدريس	□	□	□	□	□
12	جودة وخدمة الانترنت في مدرستك	□	□	□	□	□

عوامل تجعل من استخدام تكنولوجيا التعليم اكثر فعالية ونجاحا

	عوامل تجعل من استخدام تكنولوجيا التعليم اكثر فعالية ونجاحا	جدا مهم	مهم	مهم وغير مهم	ليس مهما	ليس مهما على الاطلاق
1	توفير عدد كاف من ادوات تكنولوجيا التعليم					
2	توفير تدريب كاف لأعضاء هيئة التدريس					
3	توفير المباني المناسبة					
4	توفير سياسة تعليمية واضحة					
5	دورفعال لمدير المدرسة نحو ادوات تكنولوجيا التعليم					
6	دور فعال للمعلمين نحو ادوات تكنولوجيا التعليم					
7	الدعم الفني والصيانة					
8	الدافع الشخصي والاقتناع بأهمية ادوات تكنولوجيا التعليم في التعليم					
9	تغيير بعض المفاهيم الخاطئة نحو استخدام الانترنت في المدرسة					
10	التشجيع والحوافز عند استخدام ادوات تكنولوجيا التعليم					
11	الاشراف من وزارة التربية والتعليم					

الاستراتيجيات التي تقترحونها يمكن أن تعزز تطوير تكنولوجيا المعلومات والاتصالات

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شكرا على مساعدتك

الباحث: سلطان البقمي
Email: xsx_911@hotmail.com

Appendix 6 (b)

إستبنانة المعلمين

الجنس ذكر ☐ انثى ☐

العمر:	56-60	51-55	46-50	41-45	36-40	30-35	اقل من 30
	☐	☐	☐	☐	☐	☐	☐

11- الخبرات في مجال التربية

26 سنة واكثر	21-25	16-20	11-15	6-10	1-5
☐	☐	☐	☐	☐	☐

12- المؤهل التعليمي

دكتوراه	ماجستير	بكالوريوس	دبلوم	اخرى
☐	☐	☐	☐	☐

13- **الدورات التدريبة في مجال تكنولوجيا التعليم**

	مستوى التدريب	متقدم	جيد	متوسط	ضعيف	لا يوجد تدريب
1	القواعد الاساسية في الكمبيوتر	☐	☐	☐	☐	☐
2	برنامج معالجة النصوص	☐	☐	☐	☐	☐
3	برنامج البوربوينت	☐	☐	☐	☐	☐
4	البريد الالكتروني	☐	☐	☐	☐	☐
5	تصميم صفحات الويب	☐	☐	☐	☐	☐
6	تصفح الانترنت	☐	☐	☐	☐	☐
7	الطباعة	☐	☐	☐	☐	☐
8	نسخ الملفات عبر الاسكان	☐	☐	☐	☐	☐
9	السبورة الذكية	☐	☐	☐	☐	☐
10	جهاز عرض البيانات	☐	☐	☐	☐	☐
11	صيانة الكمبيوتر	☐	☐	☐	☐	☐
12	اخرى	☐	☐	☐	☐	☐

14- **الاستخدام اليومي للكمبيوتر في اليوم الدراسي**

اكثر من 3 ساعات	من 2-3 ساعة في اليوم	اقل من ساعة في اليوم	لا استخدمه
☐	☐	☐	☐

- ***توافر واستخدام اجهزة تقنيات التعليم في مدرستك***

	اجهزة تكنولوجيا التعليم في مدرستك	متوفر ويستخدم باستمرار	متوفر مع استخدام شبه يومي	متوفر مع استخدام محدود	متوفر ولا يستخدم	غير متوفر
1	معمل حاسب الي	□	□	□	□	□
2	الوصول الى الكمبيوتر	□	□	□	□	□
3	توافر للانترنت للاداريين	□	□	□	□	□
4	توافر للانترنت للمعلمين	□	□	□	□	□
5	توافر للانترنت للطلاب	□	□	□	□	□
6	طابعة	□	□	□	□	□
7	سكانر	□	□	□	□	□
8	سبورة ذكية	□	□	□	□	□
9	عارض بيانات	□	□	□	□	□
10	فيديو /دي في دي	□	□	□	□	□
11	تلفاز	□	□	□	□	□
12	بوربوينت	□	□	□	□	□
13	معالج النصوص وورد	□	□	□	□	□
14	موقع للمدرسة في الويب	□	□	□	□	□
15	اخرى					

- ***قم بالتأشير على الاجهزة المتوفرة في مدرستك ومدى استخدامها***

- ***مستوى مهارة تكنولوجيا التعليم لديك***

	مستوى مهارة تكنولوجيا التعليم	متقدم	جيد	متوسط	ضعيف	لا يوجد مهارات
1	القواعد الاساسية في استخدام الكمبيوتر	□	□	□	□	□
2	استخدام الانترنت للمهام اليومية في العمل	□	□	□	□	□
3	استخدام برنامج معالجة النصوص	□	□	□	□	□
4	استخدام برنامج عارض الشرائح (بوربوينت)	□	□	□	□	□
5	اصلاح بعض مشاكل واعطال الكمبيوتر وكذلك بعض اجهزة تكنولوجيا التعليم	□	□	□	□	□
6	تدريب الاخرين على استخدام اجهزة تكنولوجيا التعليم	□	□	□	□	□
7	التعامل الكترونيا مع وزارة التربية والتعليم	□	□	□	□	□
8	التواصل مع ادارة المدرسة والاباء الكترونيا	□	□	□	□	□

تطبيق تكنولوجيا التعليم في المهام اليومية

	تطبيق تكنولوجيا التعليم في المهام اليومية	دائما	غالبا	بعض الاوقات	نادرا	ابدا
1	استخدم الانترنت لتحضير الدروس	□	□	□	□	□
2	استخدم برنامج معالجة النصوص	□	□	□	□	□
3	استخدم برنامج عارض الشرائح	□	□	□	□	□
4	استخدم البريد الالكتروني	□	□	□	□	□
5	التواصل الكترونيا مع وزارة التربية	□	□	□	□	□
6	استخدم الكمبيوتر لتحضير الدروس	□	□	□	□	□
7	استخدم الكمبيوتر لوضع اسئلة الاختبارات	□	□	□	□	□

8	استخدم الكمبيوتر لوضع تقييم اداء الطلاب	□	□	□	□	□
9	استخدم جهاز عرض البيانات	□	□	□	□	□
10	استخدم السبورة الذكية	□	□	□	□	□
11	اصمم برامج تعليمية لشرح دروسي	□	□	□	□	□
12	اتواصل الكترونيا مع الطلاب والاباء	□	□	□	□	□
13	اتواصل الكترونيا مع ادارة المدرسة	□	□	□	□	□
15	مهام اخرى					

- ***التحديات في تطبيق استخدام التقنية في مدرستك***

	التحديات	اوافق بشده	اوافق	معتدل	لا اوافق	لا اوافق بشده
1	ضعف الموارد المالية	□	□	□	□	□
2	محدودية الوقت لاستخدامها	□	□	□	□	□
3	ضعف في نوعية برامج التدريب المقدمة	□	□	□	□	□
4	عدم وجود او ضعف في شبكة الانترنت	□	□	□	□	□
5	ضعف البنية التحتية					
6	تصورات خاطئة لدى بعض المعلمين حول فوائد التقنية في التعليم	□	□	□	□	□
7	مشاكل متعلقة باوقات التدريب	□	□	□	□	□
8	قلة وعي لدى بعض المعلمين حول اهمية التقنية في مجال التعليم	□	□	□	□	□
9	ضعف في المساحة لإستخدامها	□	□	□	□	□
10	قلة الاماكن لحفظ الاجهزة	□	□	□	□	□
11	قلة خبرة المعلم	□	□	□	□	□
12	مشاكل في الجدول المدرسي	□	□	□	□	□
13	مقاومة المعلم للتغيير	□	□	□	□	□
14	ضعف الاشراف من قبل وزارة التعليم	□	□	□	□	□
15	ضعف الصيانة	□	□	□	□	□
16	قلة في كمية الاجهزة التقنية المطلوبة	□	□	□	□	□
17	ضعف التشجيع واحوافز	□	□	□	□	□
18	ازدياد عدد الطلاب في الفصل	□	□	□	□	□
19	سلوكيات سيئة من بعض الطلاب تجاه الاجهزة التقنية	□	□	□	□	□
20	ضعف الدعم الفني	□	□	□	□	□
21	العادات والتقاليد تؤثر على بعض مستخدمي الانترنت	□	□	□	□	□
22	ضعف في فهم سياسة التعليم تجاه استخدام واهمية التقنية	□	□	□	□	□
23	تأثير المناخ على كفاءة وعمل الاجهزة مثل الرطوبة, الحرارة وكذلك الغبار	□	□	□	□	□
24	ضعف تعاون المعلمين	□	□	□	□	□
25	ضعف في الثقة عند استخدامها	□	□	□	□	□
26	ضعف في مهارة بعض المعلمين لإدارة الصف	□	□	□	□	□
27	المحسوبية ودورها في توزيع الاجهزة بعدالة على المدارس	□	□	□	□	□
28	ضعف الاشراف من قبل مدير المدرسة	□	□	□	□	□
	تعليق اخر	□	□	□	□	□

- ***رأي المعلم حول ادماج التقنية في التعليم***

	رأيك في استخدام اجهزة التقنية في التعليم	اوافق بشده	اوافق	معتدل	لا اوافق	لا اوافق بشده
1	بصفة عامة تلعب ادوات تقنيات دورا هاما في عملية التعلم	□	□	□	□	□
2	استخدام التقنية في التعليم هي عملية مملة	□	□	□	□	□
3	باستخدام تقنيات التعليم في التدريس تجعل العمل اسهل	□	□	□	□	□
4	تجعل العمل ممتع وتبعد الروتيين	□	□	□	□	□
5	تطور نتائج الطلاب	□	□	□	□	□
6	تحفظ الوقت	□	□	□	□	□

7	تزيد التعاون بين الطلاب والمعلم	□	□	□	□	□
8	تطور مهارات البحث لكل من الطلاب والمعلمين	□	□	□	□	□
9	انا متحمس للتعلم حول تقنيات التعليم	□	□	□	□	□
10	نحتاج تهيئة المباني المدرسية مبكرا قبل ادماج التقنية فيها	□	□	□	□	□
11	الاموال التي تصرف على تقنيات التعليم لا تستحق هذا	□	□	□	□	□
12	نحتاج تدريب المعلمين مبكرا قبل ان نطلب منهم استخدام هذه الادوات تفاديا للاعطال والملل من استخدامها	□	□	□	□	□
13	نحتاج تغيير بعض الافكار الخاطئة لدى بعض المعلمين والطلاب حول اهمية ادوات التقنية	□	□	□	□	□
14	لا يمكن ان يكون هنالك تأثير من استخدام ادوات التقنية قبل ان يكون هنالك مبدأ للثواب والعقاب	□	□	□	□	□
15	الطرق التقليدية في التعليم هي افضل من استخدام التقنية	□	□	□	□	□
16	استخدام ادوات التقنية هو مجرد مضيعة للوقت	□	□	□	□	□
17	لا اشجع استخدام الانترنت في مدرستي لانه يتعارض مع عاداتنا وقيمنا	□	□	□	□	□
18	امنع استخدام الانترنت في مدرستي لان بعض الطلاب يميلون لاستخدامه في اغراض ليست تعليمية	□	□	□	□	□
19	من منظور ديني اعتقد انه يجب منع الانترنت في المدارس	□	□	□	□	□
20	امنع استخدام الانترنت في مدرستي لن طلاب المرحلة الثانوية هم في سن حرج ويحتاج المراقبة	□	□	□	□	□
21	اخرى					

- ***وجهة نظرك حول سياسة التعليم تجاه استخدام ادوات تكنولوجيا التعليم***

	وجهة نظرك حول سياسة التعليم تجاه استخدام ادوات تكنولوجيا التعليم	اوافق بشدة	اوافق	معتدل	لا اوافق	لا اوافق بشده
1	سياسة تكنولوجيا التعليم غير واضحة	□	□	□	□	□
2	اثرت سياسة التعليم ايجابا نحو استخدامي لتكنولوجيا التعليم	□	□	□	□	□
3	تطبيق سياسة التعليم ليست مسؤليتي , بل مسؤلية وزارة التربية	□	□	□	□	□
4	اولي اهتماما ضعيفا لسياسة التعليم وذلك لعدم وضوحها	□	□	□	□	□
5	سياسة التعليم مجرد نظريات لم تطبق على ارض الواقع	□	□	□	□	□
6	هنالك ضعف في شرح اهداف وتوجهات سياسة التعليم	□	□	□	□	□
7	القى دعما وتشجيعا من الوزارة عند تطبيق سياسة التعليم	□	□	□	□	□
8	لا املك اي فكرة عن سياسة التعليم	□	□	□	□	□
9	لدى وزارة التربية والتعليم اهتمام بالغ لرفع الوعي حول سياسة التعليم	□	□	□	□	□
10	لم توفر الوزارة اي تطوير لسياستها التعليمية	□	□	□	□	□
11	انها مسؤلية وزارة التربية لرفع وعي المعلمين مسبقا عن سياستها التعليمية	□	□	□	□	□
12	لا احتاج ان اعرف شيئا عن سياسة التعليم لانه لن يسألني احدا عنها	□	□	□	□	□
13	حقيقة, لم اسمع مسبقا عن سياسة التعليم	□	□	□	□	□
14	اخرى					

- ***دور المعلم نحو تفعيل سياسة التعليم***

	دور المعلم نحو تفعيل سياسة التعليم	دائما	غالبا	بعض الاوقات	نادرا	ابدا
1	اشرك الطلاب في استخدام ادوات التعليم	□	□	□	□	□
2	اطلب من ادارة المدرسة توفير الاجهزة والصيانة	□	□	□	□	□
3	ليست مسؤليتي توفير اجهزة تقنيات التعليم, هي مسؤلية مدير المدرسة	□	□	□	□	□
4	اشجع الطلاب على البحث عن المعلومة عبر استخدام الانترنت	□	□	□	□	□
5	اشجع واطلب زملائي المعلمين على تفعيل استخدام ادوات تكنولوجيا التعليم	□	□	□	□	□

6	احرص على عدم استخدام ادوات تكنولوجيا التعليم قبل التدريب على استخدامها	□	□	□	□	□
7	اطلب من الطلاب ايلاء اهتمام حول مبادئ السلامة عند استخدام الاجهزة	□	□	□	□	□
8	اولي اهتمام لمبادئ السلامة	□	□	□	□	□
9	ادفع من جيبي الخاص لاصلاح اعطال الاجهزة اذا لم اجد استجابة من ادارة المدرسة	□	□	□	□	□
10	من واجبي ان اقيم الطلاب عند استخدام الاجهزة	□	□	□	□	□
11	احرص على متابعة الجديد والتطور في مجال تكنولوجيا التعليم	□	□	□	□	□
12	احرص على استخدام تكنولوجيا التعليم في دروسي لإبعاد الروتين	□	□	□	□	□
13	احرص على توفير المكان المناسب لإستخدام تكنولوجيا التعليم	□	□	□	□	□
14	احرص على متابعة طلبات الطلاب حول مايحتاجون من توفير تكنولوجيا التعليم, واعمل على توفيرها.	□	□	□	□	□
15	احرص على صيانة واصلاح اعطال اجهزة تكنولوجيا التعليم	□	□	□	□	□
16	احرص على حضور البرامج التدريبية في مجال تكنولوجيا التعليم	□	□	□	□	□
17	اشرك الطلاب في استخدام تكنولوجيا التعليم	□	□	□	□	□
18	تعليق اخر					

- ***مستوى الرضا عن الوضع الحالي لأدوات تكنولوجيا التعليم في مدرستك***

الى اي مدى انت راض عن النقاط التالية

	مستوى الرضا عن الوضع الحالي لأدوات تكنولوجيا التعليم في مدرستك	راض بشدة	راض	معتدل	لست راض	لست راض بشدة
1	الوضع الحالي من حيث توافر الاجهزة	□	□	□	□	□
2	الدعم والتشجيع من وزارة التعليم	□	□	□	□	□
3	الفوائد والنتائج الملموسة من استخدام ادوات التكنولوجيا في التعليم	□	□	□	□	□
4	سلوكيات بعض الطلاب تجاه ادوات التعليم التقنية	□	□	□	□	□
5	جودة اجهزة تقنيات التعليم	□	□	□	□	□
6	التدريب المقدم حول ادوات التقنية	□	□	□	□	□
7	التطور في توفير اجهزة التعليم التقنية	□	□	□	□	□
8	مهاراتك حول استخدام تكنولوجيا التعليم	□	□	□	□	□
9	دورك تجاه تكنولوجيا التعليم	□	□	□	□	□
10	وضوح واهداف سياسة التعليم	□	□	□	□	□
11	التعاون بين اعضاء هيئة التدريس	□	□	□	□	□
12	جودة وخدمة الانترنت في مدرستك	□	□	□	□	□

عوامل تجعل من استخدام تكنولوجيا التعليم اكثر فعالية ونجاحا

	عوامل تجعل من استخدام تكنولوجيا التعليم اكثر فعالية ونجاحا	جدا مهم	مهم	مهم وغير مهم	ليس مهما	ليس مهما على الاطلاق
1	توفير عدد كاف من ادوات تكنولوجيا التعليم					
2	توفير تدريب كاف لأعضاء هيئة التدريس					
3	توفير المباني المناسبة					
4	توفير سياسة تعليمية واضحة					
5	دور مدير المدرسة نحو ادوات تكنولوجيا التعليم					
6	دور المعلمين نحو ادوات تكنولوجيا التعليم					
7	الدعم الفني والصيانة					
8	الدافع الشخصي والاقتناع بأهمية ادوات تكنولوجيا التعليم في التعليم					

9	تغيير بعض المفاهيم الخاطئة نحو استخدام الانترنت في المدرسة					
10	التشجيع والحوافز عند استخدام ادوات تكنولوجيا التعليم					
11	الاشراف من وزارة التربية والتعليم					

الاستراتيجيات التي تقترحونها يمكن أن تعزز تطوير تكنولوجيا المعلومات والاتصالات

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شكرا على مساعدتك

الباحث: سلطان البقمي
Email: xsx_911@hotmail.com

Appendix 6 (c)
استبانة الطلاب

- ***المعومات الشخصية***

- الجنس ذكر ☐ انثى ☐

هل لديك كمبيوتر في المنزل ☐ **نعم** ☐ **لا**

اذا اجابتك نعمكم ساعة تستخدمه يوميا

1- **الاستخدام اليومي للكمبيوتر في اليوم الدراسي**

لا استخدمه	اقل من ساعة في اليوم	من 2-3 ساعة في اليوم	اكثر من 3 ساعات
☐	☐	☐	☐

- ***الوضع الحالي في مدرستك***

	توافر واستخدام ادوات تكنولوجيا التعليم	متوفر ويستخدم طوال الوقت	متوافر مع استخدام متفاوت	متوفر مع استخدام محدود	متوفر ولا يستخدم مطلقا	غير متوافر
1	معمل حاسب الى	☐	☐	☐	☐	☐
2	وصول لمعمل الحاسب الالي	☐	☐	☐	☐	☐
3	وصول للانترنت	☐	☐	☐	☐	☐
4	طابعة	☐	☐	☐	☐	☐
5	سكانر	☐	☐	☐	☐	☐
6	سبورة ذكية	☐	☐	☐	☐	☐
7	عارض بيانات	☐	☐	☐	☐	☐
8	DVD وCDs	☐	☐	☐	☐	☐
9	تلفاز	☐	☐	☐	☐	☐
10	عارض الشرائح	☐	☐	☐	☐	☐
11	برنامج معالج النصوص	☐	☐	☐	☐	☐
12	موقع للمدرسة على الانترنت	☐	☐	☐	☐	☐
13	اجهزة اخرى					

مهارات الطالب تجاه اجهزة تكنولوجيا التعليم.

	مهارات الطالب تجاه اجهزة تكنولوجيا التعليم.	متقدم	جيد	متوسط	ضعيف	لا يوجد مهاره
1	اساسيات علوم الحاسب	☐	☐	☐	☐	☐
2	تصفح الانترنت	☐	☐	☐	☐	☐
3	العمل على برنامج معالج النصوص	☐	☐	☐	☐	☐
4	العمل على برنامج عارض الشرائح	☐	☐	☐	☐	☐

- ***استخدامات الطالب لإجهزة تكنولوجيا التعليم***

	استخدامات الطالب لإجهزة تكنولوجيا التعليم	دائما	غالبا	بعض الاوقات	نادرا	ابدا
1	استخدم الانترنت لغرض التعلم في مدرستي	□	□	□	□	□
2	استخدم برنامج معالج النصوص	□	□	□	□	□
3	استخدم برنامج عارض الشرائح	□	□	□	□	□
4	*استخدم الانترنت في مدرستي لعمل محادثات وتواصل اجتماعي*	□	□	□	□	□
5	استخدم الكمبيوتر لعمل الواجبات المنزلية	□	□	□	□	□

- ***تحديات تواجه استخدام تكنولوجيا التعليم في مدرستك***

	التحديات	اوافق بشده	اوافق	معتدل	لا اوافق	لا اوافق بشده
1	ضعف وبطء الانترنت	□	□	□	□	□
2	البنية التحتية للمدرسة	□	□	□	□	□
3	ضعف المساحة المناسبة لاستخدامها	□	□	□	□	□
4	ضعف خبرات المعلمين	□	□	□	□	□
5	ضعف في اشراف مدير المدرسة	□	□	□	□	□
6	ضعف الصيانة	□	□	□	□	□
7	قلة اجهزة تكنولوجيا التعليم	□	□	□	□	□
8	تزايد اعداد الطلاب في الفصل	□	□	□	□	□
9	سلوكيات سلبية من بعض الطلاب	□	□	□	□	□
10	ضعف الدعم الفني	□	□	□	□	□
11	العادات والتقاليد	□	□	□	□	□
12	تأثير المناخ	□	□	□	□	□
13	ضعف التعاون بين اعضاء المدرسة	□	□	□	□	□
14	سلوكيات سلبية من المعلمين	□	□	□	□	□
15	ضعف مهارات المعلمين	□	□	□	□	□
16	تحديات اخرى					

- ***وجهات نظر وتصورات الطالب حول ادماج تكنولوجيا التعليم في التعليم***

	وجهات النظر والتصورات	اوافق بشده	اوافق	معتدل	لا اوافق	لا اوافق بشده
1	اجد استخدام تكنولوجيا التعليم في مدرستي ممتع	□	□	□	□	□
2	اتعلم افضل مع تكنولوجيا التعليم مقارنة بطرق التدريس التقليدية	□	□	□	□	□
3	تلعب تكنولوجيا التعليم دورا مهما في العملية التعليمية	□	□	□	□	□
4	لدي تصورات وسلوكيات ايجابية تجاه اجهزة تكنولوجيا التعليم	□	□	□	□	□
5	تكنولوجيا التعليم تطور المعرفة لدى الطالب	□	□	□	□	□
6	استخدام تكنولوجيا التعليم تحفظ الوقت وتقلل الجهد	□	□	□	□	□
7	تكنولوجيا التعليم تزيد التعاون بين الطالب والمعلم	□	□	□	□	□
8	تكنولوجيا التعليم تطور مهارات البحث لدى الطالب	□	□	□	□	□
9	استخدام تكنولوجيا التعليم هو عملية مملة	□	□	□	□	□
10	اشعر بالممل عندما يطلب مني عمل واجباتي المنزلية عن طريق استخدام الكمبيوتر	□	□	□	□	□
11	استخدام تكنولوجيا التعليم في التدريس تسبب لي توترا	□	□	□	□	□
12	تعلم الكمبيوتر ليس مهما لمستقبلي	□	□	□	□	□
13	لا اشعر بالسعادة في معمل الحاسب الالي	□	□	□	□	□
14	اكره التحدث مع الاخرين عن تكنولوجيا التعليم	□	□	□	□	□
15	انه من الصعب تعلم مهارات الحاسب الالي	□	□	□	□	□
16	تعليق اخر	□	□	□	□	□

- ***رأيك بدور مدير مدرستك نحو ادوات تكنولوجيا التعليم***

	• ***رأيك بدور مدير مدرستك نحو ادوات تكنولوجيا التعليم***	اوافق بشده	اوافق	معتدل	لا اوافق	لا اوافق بشده
1	*اشعر ان مدير المدرسة متحمس لتوفير ادوات تكنولوجيا التعليم*	□	□	□	□	□
2	*اشعر ان مدير المدرسة حريص على تطوير وتحديث معمل الحاسب الالي*	□	□	□	□	□
3	*يراقب مدير المدرسة باستمرار تفعيل واستخدام ادوات تكنولوجيا التعليم*	□	□	□	□	□
4	*يمنع مدير المدرسةاستخدام الانترنت في المدرسة*	□	□	□	□	□
5	*يشجع ويدعم مدير المدرسة استخدام معمل الحاسب الالي خلال اليوم الدراسي طوال الوقت*	□	□	□	□	□
7	*مدير المدرسة هو المسؤول عن متابعة المعلمين في تفعيل ادوات تكنولوجيا التعليم*	□	□	□	□	□
8	*يسمح مدير المدرسة التواصل معه الكترونيا*	□	□	□	□	□
9	*من مسؤلية مدير المدرسة توفير الصيانة لادوات تكنولوجيا التعليم*	□	□	□	□	□
10	اخرى					

- ***وجهة نظر الطالب تجاه ادوات تكنولوجيا التعليم و منهج الحاسب الالي***

	وجهة نظر الطالب تجاه ادوات تكنولوجيا التعليم و منهج الحاسب الالي	اوافق بشده	اوافق	معتدل	لا اوافق	لا اوافق بشده
1	في مدرستي ادوات تكنولوجيا التعليم في حالة جيدة وذات جودة عالية	□	□	□	□	□
2	جميع وسائل السلامة متوفرة عند استخدام ادوات تكنولوجيا التعليم	□	□	□	□	□
3	المساحات كافية لاستخدام ادوات تكنولوجيا التعليم	□	□	□	□	□
4	الانترنت يعمل بصورة جيده	□	□	□	□	□
5	الفصول الدراسية مهيأة مسبقا لاستخدام ادوات تكنولوجيا التعليم	□	□	□	□	□
6	جميع التسهيلات متوفرة في معمل الحاسب الالي مثل الطاولات المناسبة والاحبار واوراق الطباعة	□	□	□	□	□
7	معمل الحاسب الالي نظيف ومرتب بصفة دائمة	□	□	□	□	□
8	كمية الكمبيوترات في معمل الحاسب الالي مناسبة لعدد الطلاب	□	□	□	□	□
9	ادوات تكنولوجيا التعليم تحتاج تطوير	□	□	□	□	□
10	نطبق عمليا ماتعلمناه عن الكمبيوتر	□	□	□	□	□
11	منهج الحاسب الالي سهل بالنسبة لي	□	□	□	□	□
12	ساعدني منهج الحاسب الالي لتعلم عن الكمبيوتر	□	□	□	□	□
13	منهج الحاسب الالي ضعيف ولا يقدم اي جديد للطالب	□	□	□	□	□
14	انا اعرف اغلب محتويات منهج الحاسب الالي مسبقا	□	□	□	□	□
15	منهج الحاسب الالي يحتاج تطوير	□	□	□	□	□
16	منهج الحاسب الالي قديم ولا يتماشى مع التطور الجديد في عالم التكنولوجيا	□	□	□	□	□
17	تعليق اخر	□	□	□	□	□

- ***وجهة نظرك تجاه دور المعلم نحو تفعيل ادوات تكنولوجيا التعليم***

	وجهة نظرك تجاه دور المعلم نحو تفعيل ادوات تكنولوجيا التعليم	اوافق بشده	اوافق	معتدل	لا اوافق	لا اوافق بشده
1	المعلمين في مدرستي ليسوا حريصين على استخدام ادوات تكنولوجيا التعليم	□	□	□	□	□
2	المعلمين في مدرستي يشركونا عمليا في استخدام ادوات تكنولوجيا التعليم	□	□	□	□	□
3	اشعر ان معظم المعلمين مؤهلين على استخدام ادوات تكنولوجيا التعليم	□	□	□	□	□
4	يعطي المعلمين اولوية لإستخدام ادوات تكنولوجيا التعليم	□	□	□	□	□

5	يولي المعلمين انتباها لمبدأ السلامة عند استخدام ادوات تكنولوجيا التعليم	□	□	□	□	□
6	لا يولي بعض المعلمين اهتماما لصيانة ادوات تكنولوجيا التعليم	□	□	□	□	□
7	لا يولي بعض المعلمين اهتماما للاعداد المسبق قبل استخدام ادوات تكنولوجيا التعليم	□	□	□	□	□
8	اشعر ان هنالك بعض المعلمين يغفلون استخدام ادوات تكنولوجيا التعليم عمدا	□	□	□	□	□
9	اشعر ان معلم مادة الحاسب الالي مؤهل جيدا	□	□	□	□	□
10	معلم الحاسب الالي يهتم بتهيئة المعمل قبل حضورنا	□	□	□	□	□
11	يعطي معلم الحاسب الالي معلومات وارشادات قبل البدء في استخدام الاجهزة	□	□	□	□	□
12	يجعلنا معلم الحاسب نعمل في مجموعات	□	□	□	□	□
13	اجد دعما وتشجيعا من معلم الحاسب عند التقدم في استخدامه	□	□	□	□	□
14	يسمح معلم الحاسب الالي استخدام الانترنت في معمل الحاسب	□	□	□	□	□
15	يتركنا معلم الحاسب في المعمل دون رقابة	□	□	□	□	□
16	يحرص معلم الحاسب على تدريبنا على كل ماهو جديد في عالم الحاسب	□	□	□	□	□
17	تعليق اخر					

- ***مستوى رضاك عن الوضع الراهن لادوات تكنولوجيا التعليم في مدرستك***

	مستوى رضاك عن الوضع الراهن لادوات تكنولوجيا التعليم في مدرستك	راض بشدة	راض	معتدل	لست راض	لست راض بشدة
1	الوضع الحالي من توافر واستخدام ادوات تكنولوجيا التعليم					
2	النتائج من استخدام تكنولوجيا التعليم					
3	سلوكيات الطلاب					
4	جودة اجهزة تكنولوجيا التعليم					
5	التقدم في ادماج التكنولوجيا في مدرستك					
6	مهاراتك تجاه استخدام تكنولوجيا التعليم					
7	التعاون بين العاملين في المدرسة					
8	خدمة وجودة الانترنت في مدرستك					

- ***عوامل تساعد في انجاح استخدام تكنولوجيا التعليم في مدرستك***

	عوامل تساعد في انجاح استخدام تكنولوجيا التعليم في مدرستك	جدا مهم	مهم	مهم وغير مهم	ليس مهما	ليس مهما على الاطلاق
1	توفير عدد كاف من ادوات تكنولوجيا التعليم					
2	توفير برامج تدريبية في استخدام تكنولوجيا التعليم					
3	توفير مباني مناسبة					
4	دور مدير مدرسة فعال					
5	دور معلم فعال					
6	دعم فني وصيانة					
7	تغيير بعض المفاهيم الخطئة حول الانترنت					
8	الاشراف من وزارة التعليم					

الاستراتيجيات التي تقترحونها يمكن أن تعزز تطوير تكنولوجيا المعلومات والاتصالات

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